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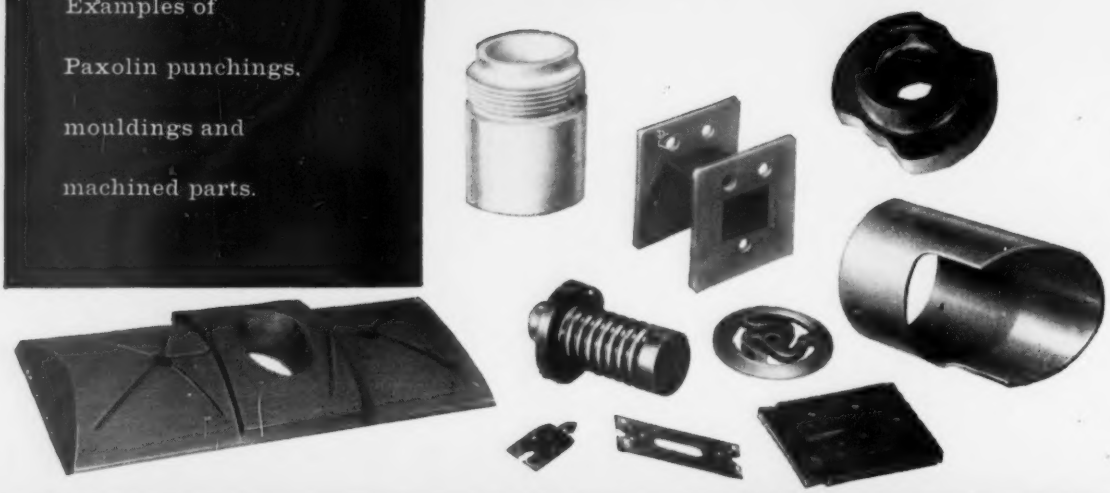

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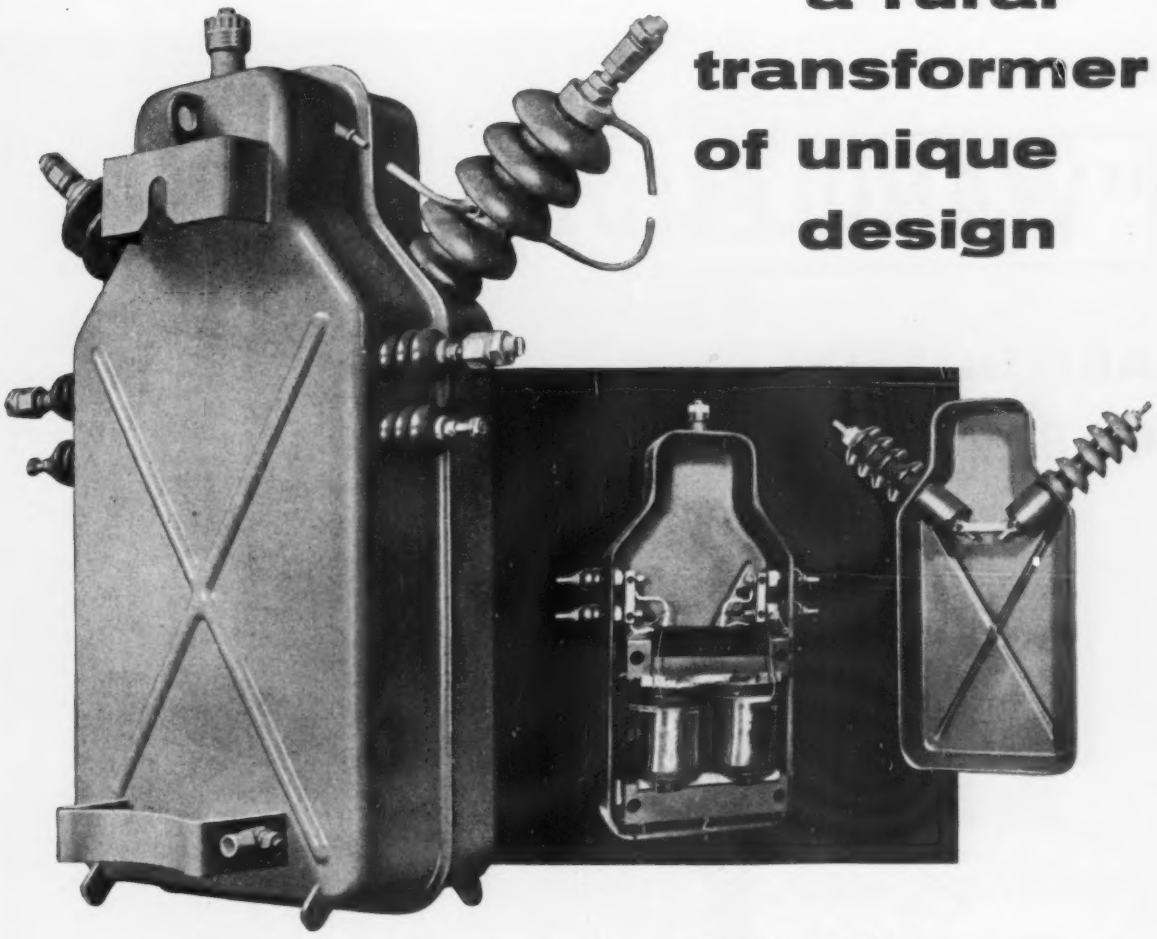

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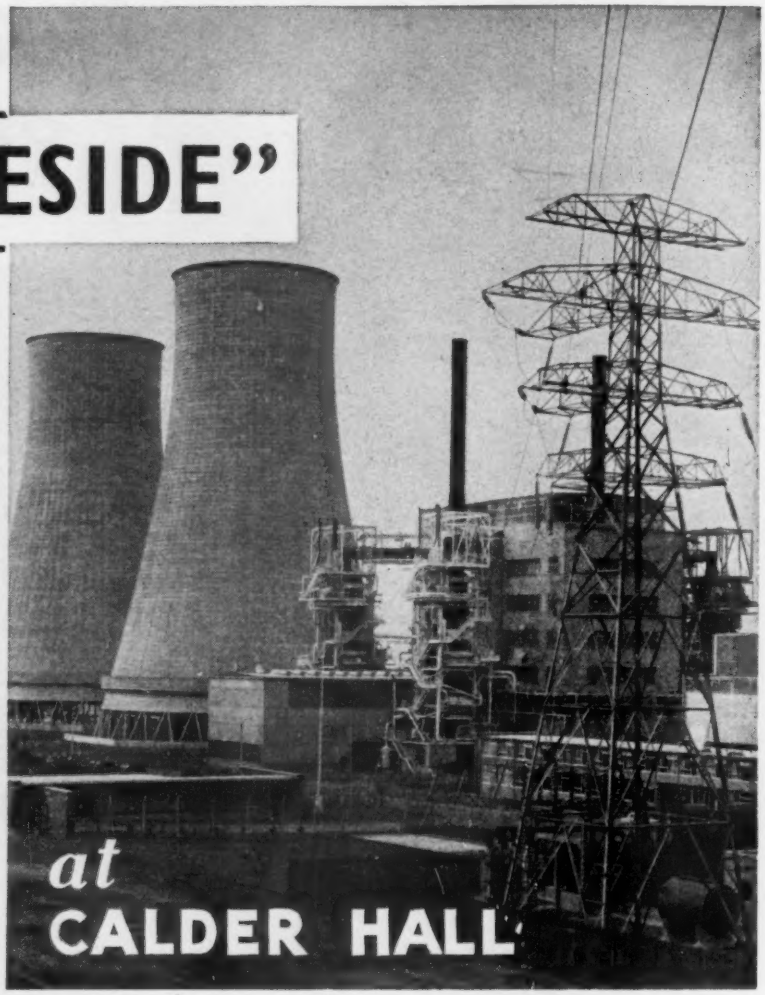

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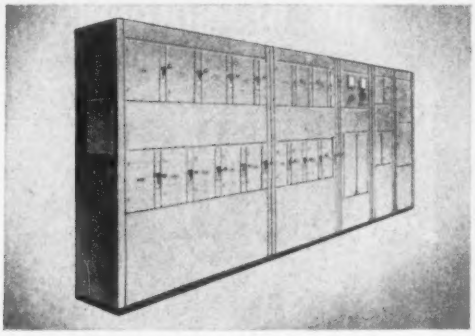

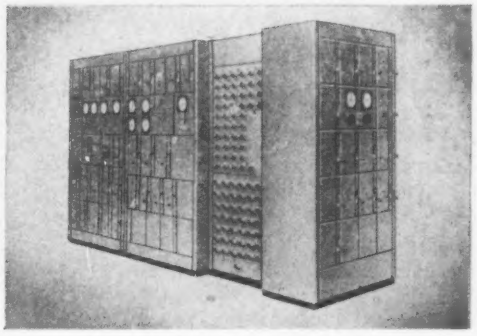

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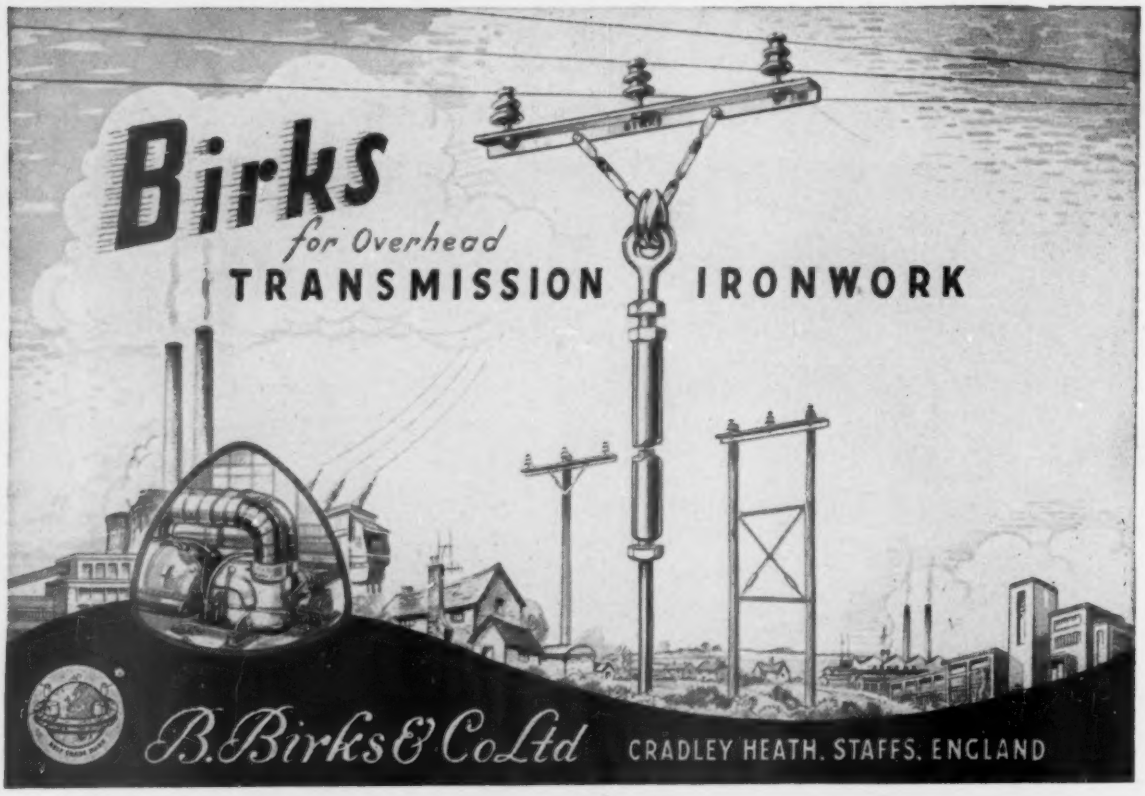

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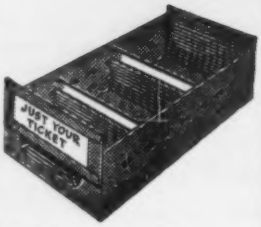

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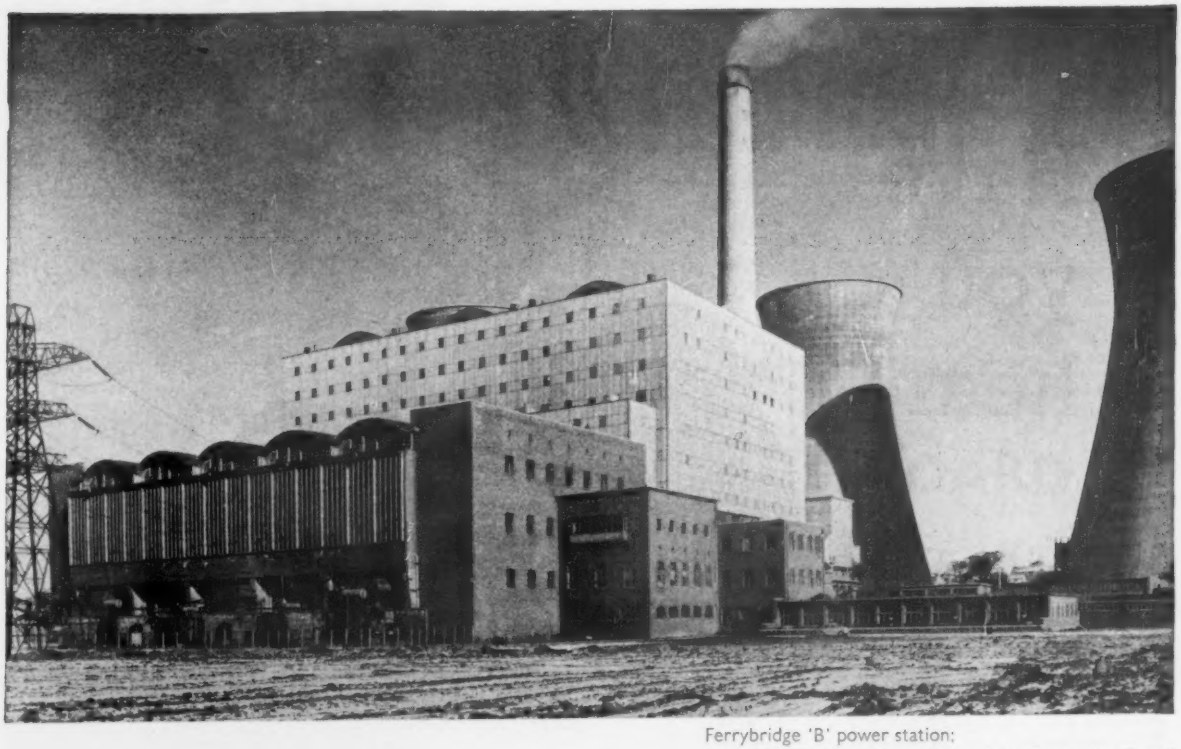
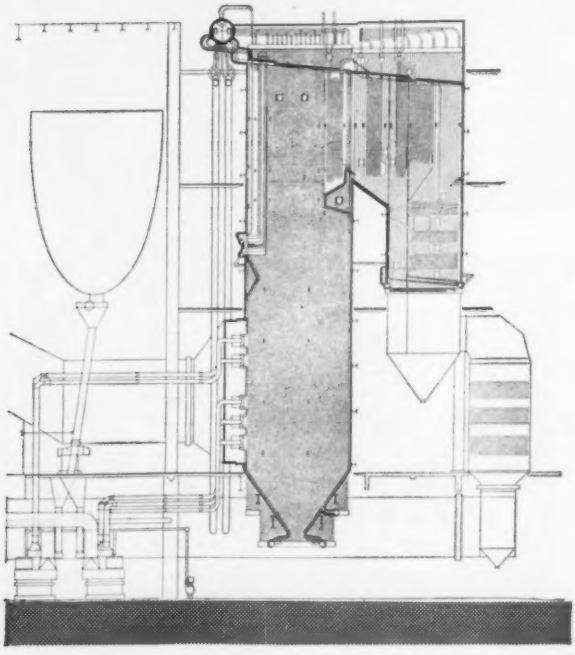


Ferrybridge 'B' power station:
Yorkshire Division, Central Electricity Generating Board.

BABCOCK at *Ferrybridge 'B'*

STEAM-RAISING PLANT



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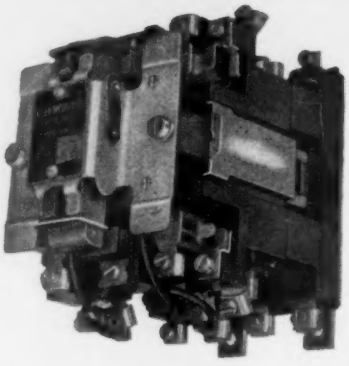

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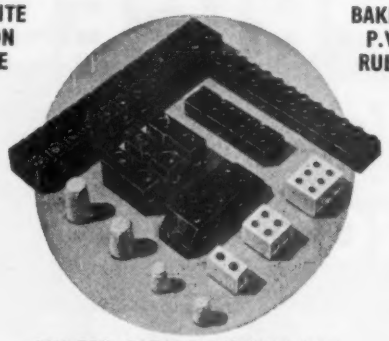

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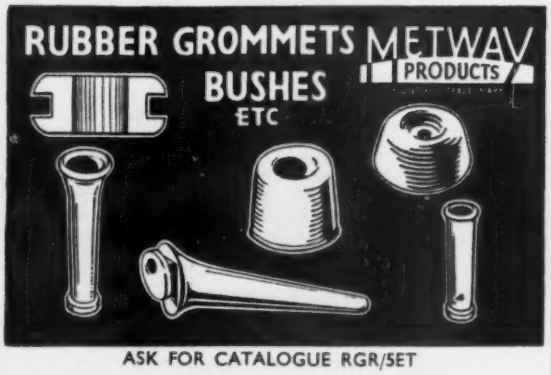

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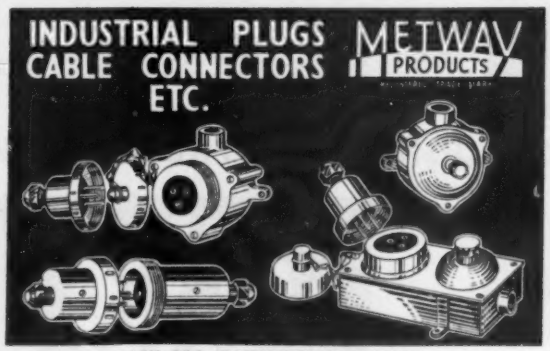

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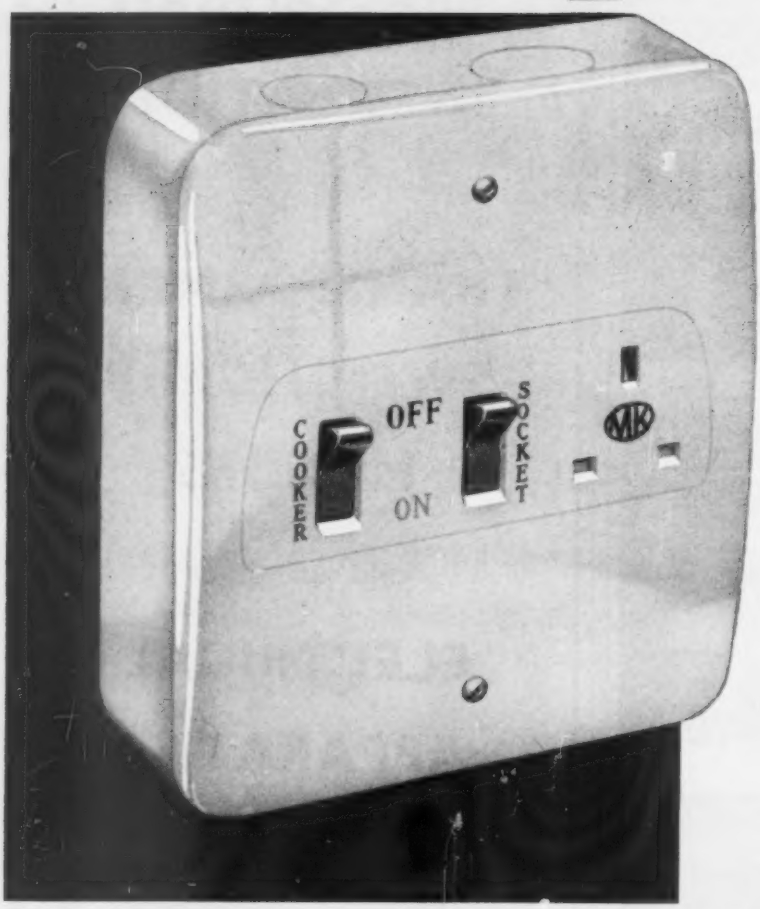

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This is attached direct to the chassis, in addition to the existing earthing terminal in the base of the box.

✻ **EXTRA FIXING HOLES**

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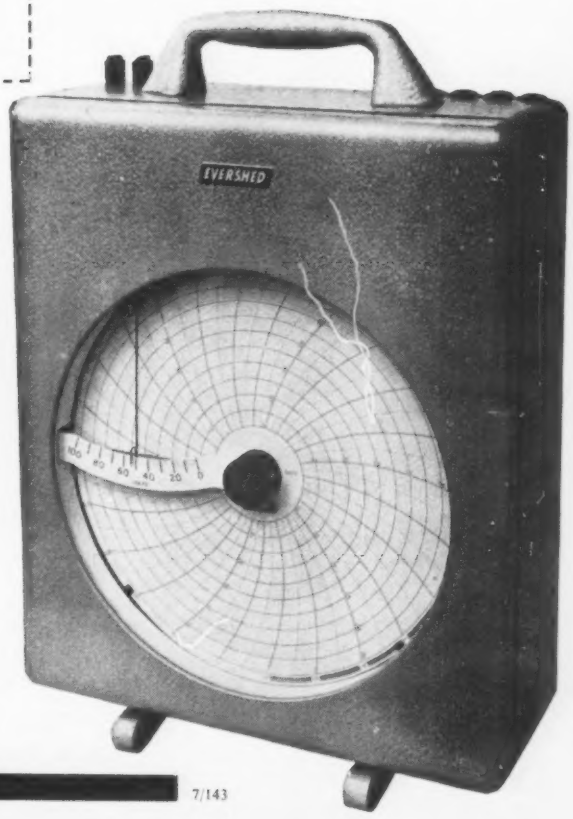

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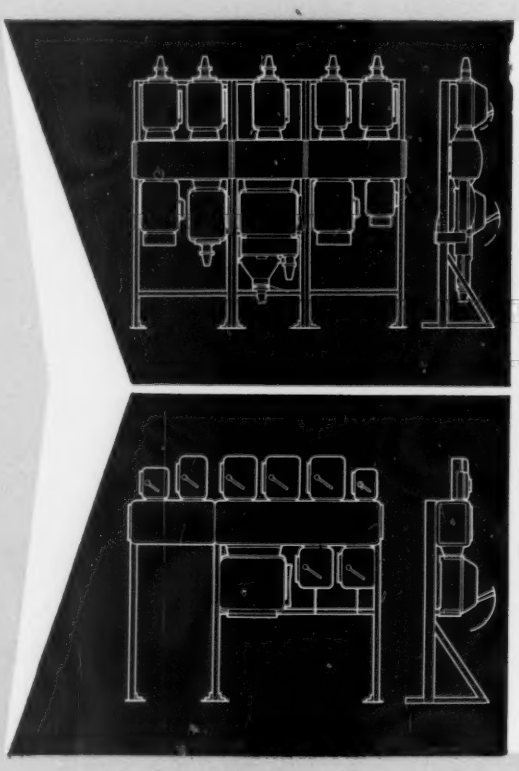

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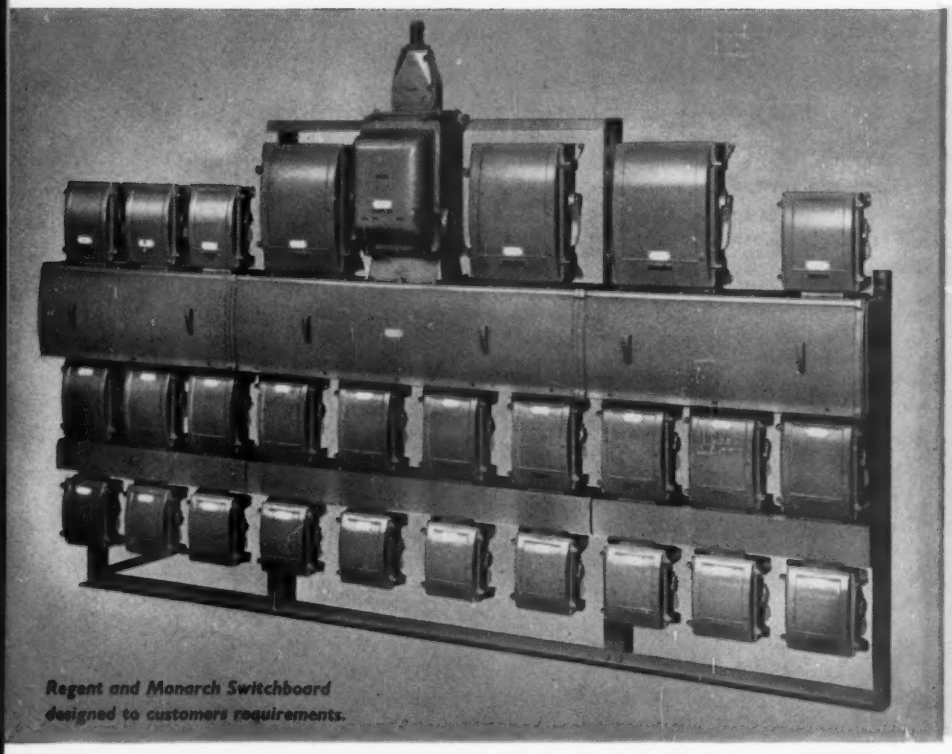

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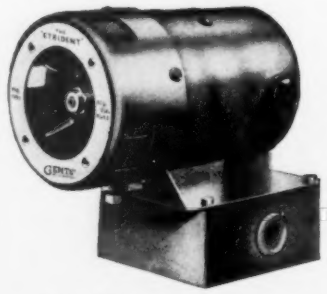
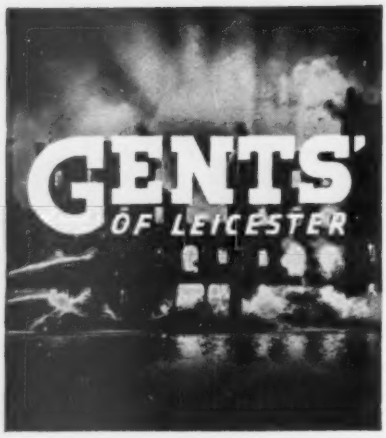


The "STRIDENT" Syren

Alarms



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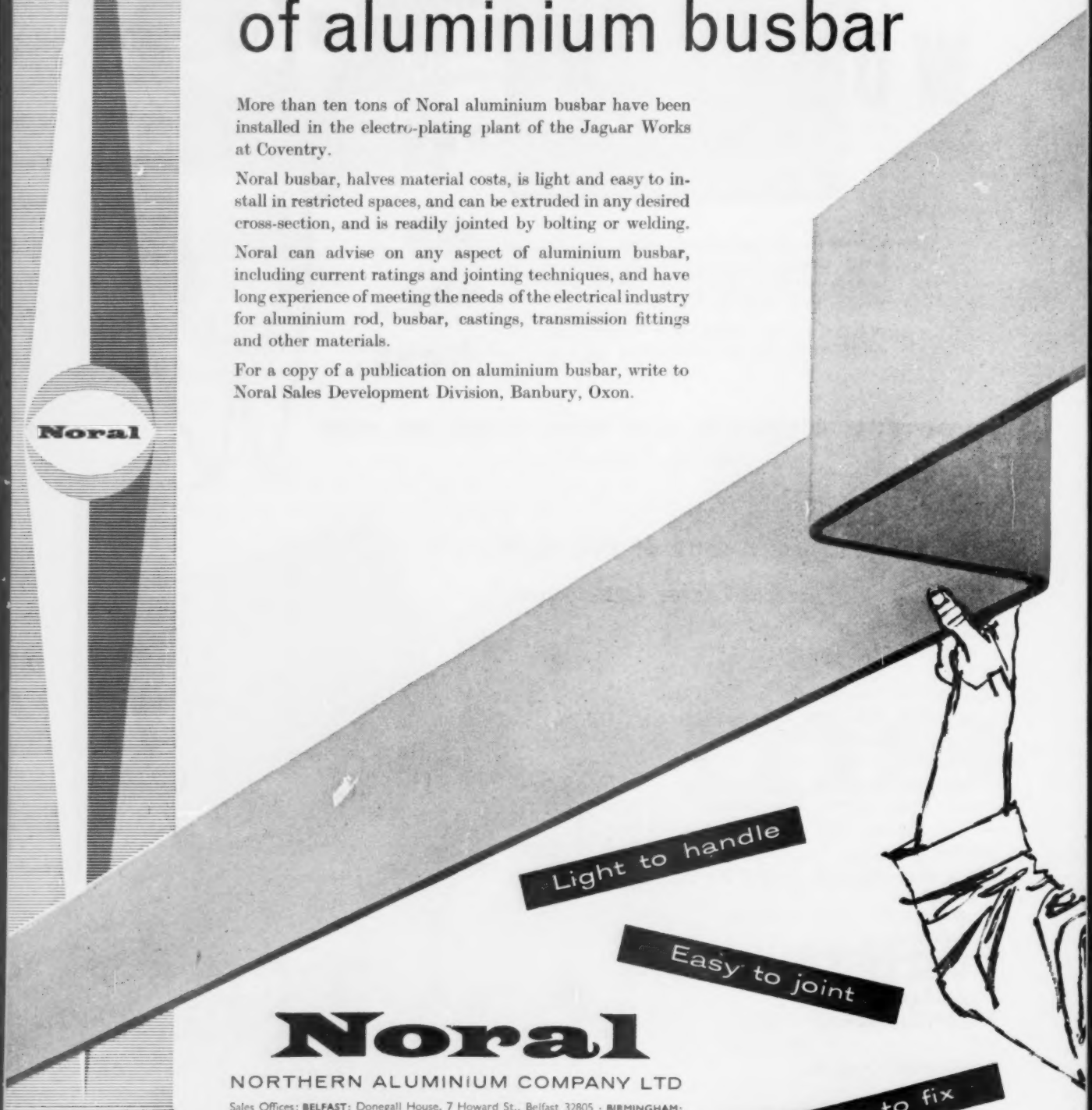

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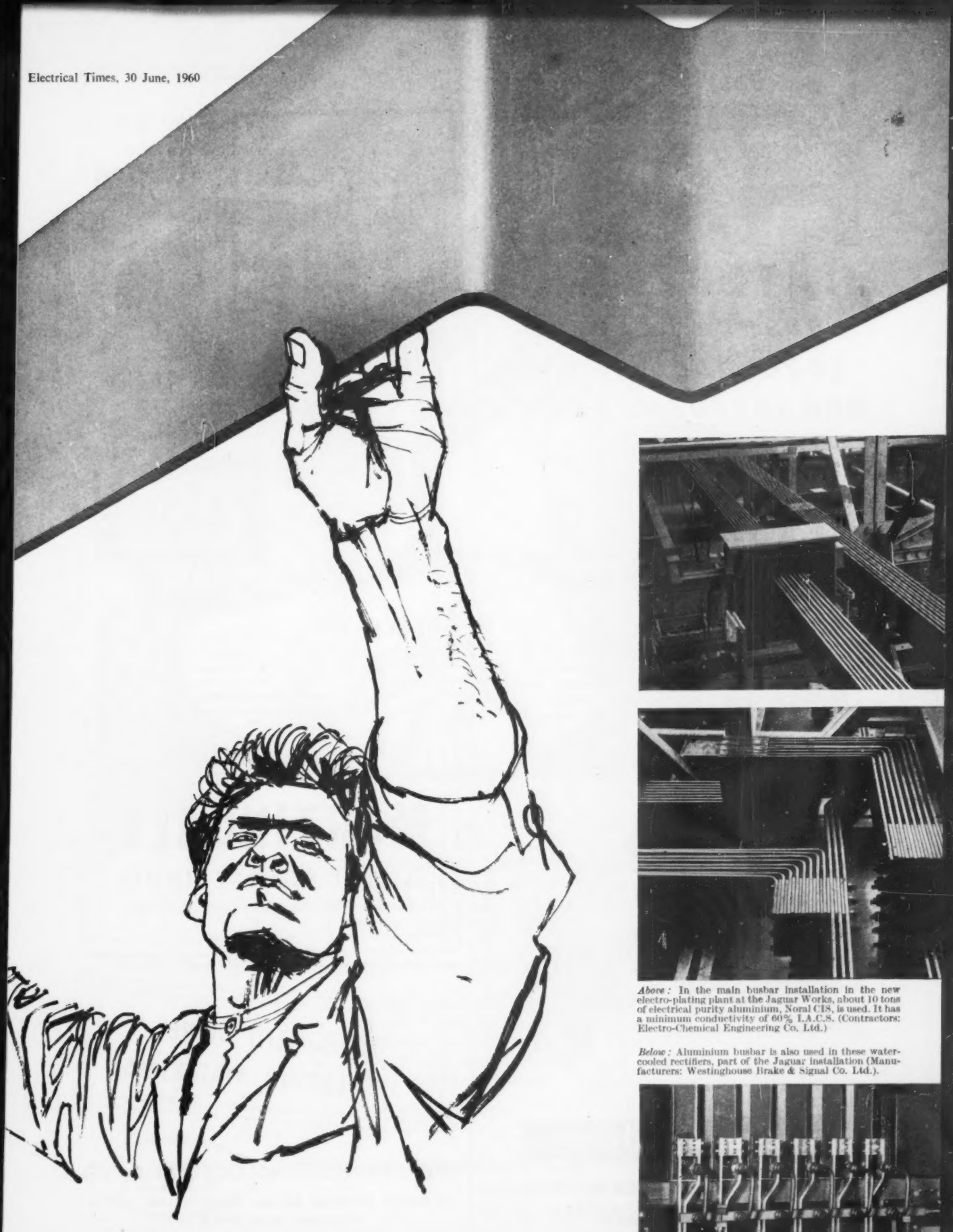
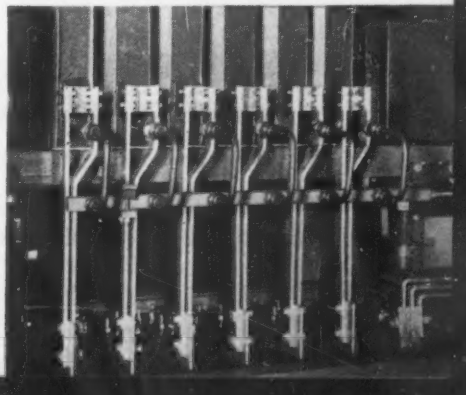


Above: In the main busbar installation in the new electro-plating plant at the Jaguar Works, about 10 tons of electrical purity aluminium, Noral CIS, is used. It has a minimum conductivity of 60% I.A.C.S. (Contractors: Electro-Chemical Engineering Co. Ltd.)

Below: Aluminium busbar is also used in these water-cooled rectifiers, part of the Jaguar installation (Manufacturers: Westinghouse Brake & Signal Co. Ltd.).



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assure correct sequence control and increase safety

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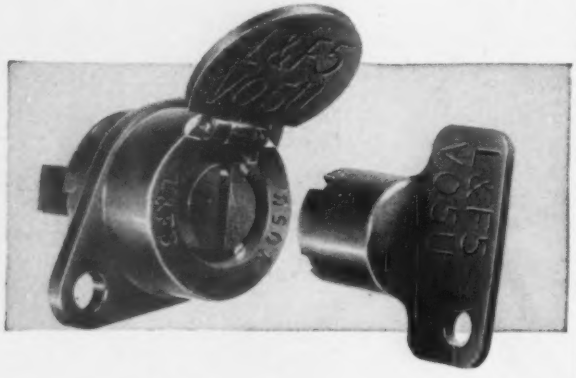

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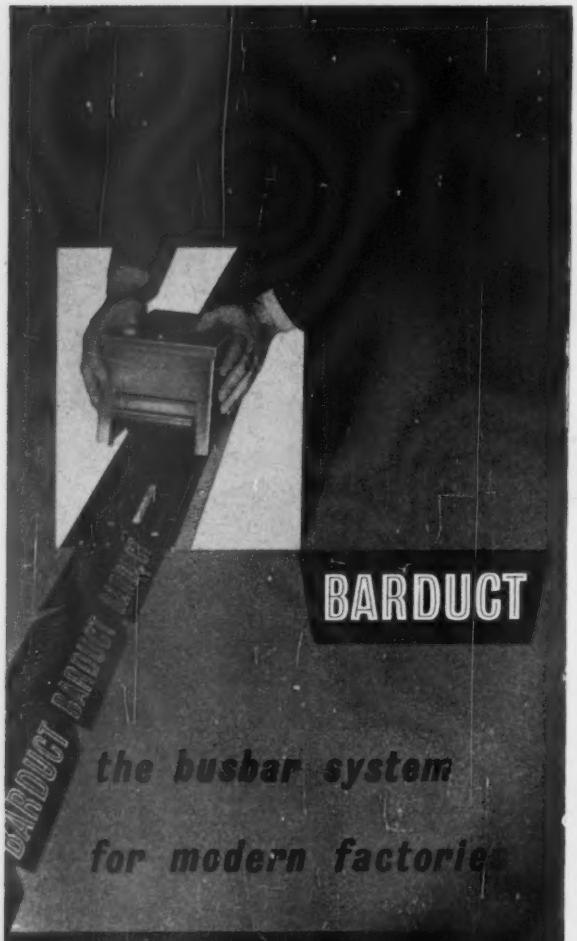

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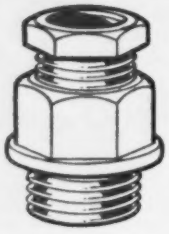

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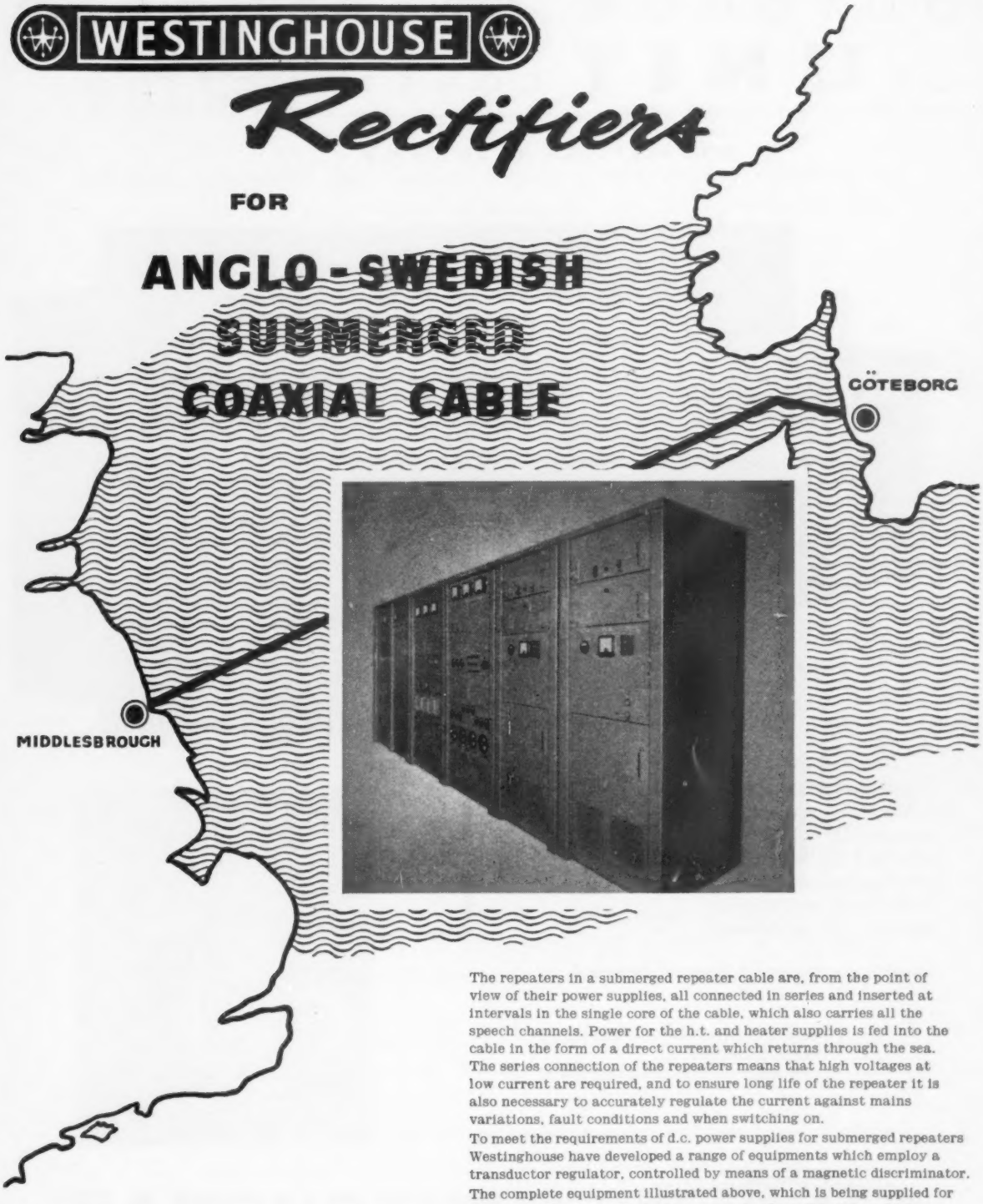

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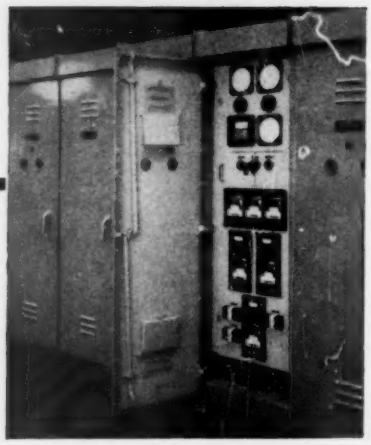

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Voltage. 2.2.—15 kV.
MVA ratings from 100 MVA—500 MVA

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NEWS SHEET

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Switchgear for installation where it is neither practicable nor economically possible to build a covered Sub-station of weather-proof construction. Readily accessible on both sides for operation and maintenance.

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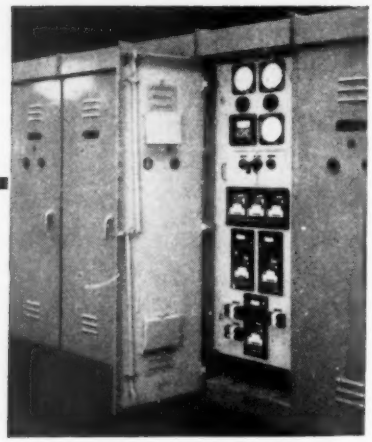

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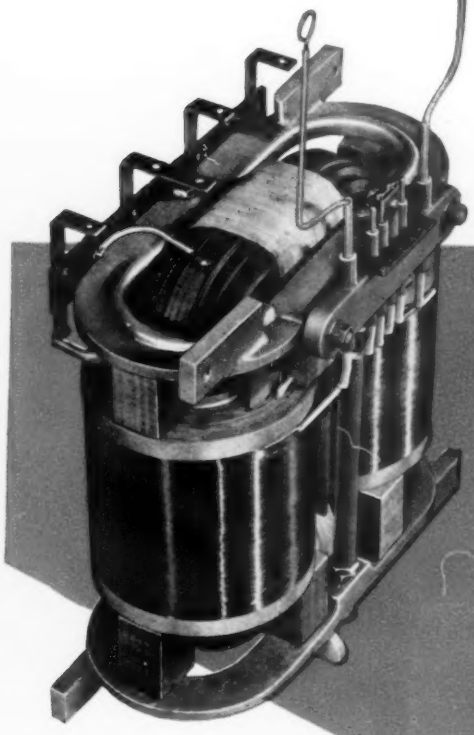

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High resistance to line surges.
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Closed loop core of grain oriented steel.

RATINGS AND VOLTAGES

The transformers are manufactured in a range of five sizes, viz., 5, 10, 15, 25 and 50 kVA and are designed for operating on a single-phase, 50 cycle, 11 kV or 6·6 kV supply.

OVERLOAD CAPACITY

The transformers are capable of withstanding the following overloads for two hours, without injurious heating, following continuous full load with an average ambient temperature not exceeding 20°C.

5 kVA	100%
10 kVA	45%
15 kVA	25%
25 kVA	15%
50 kVA	As B.S. 171 and C.P. 1010.

IMPULSE LEVEL

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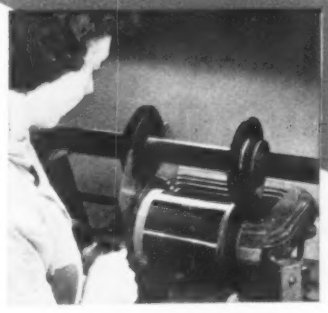
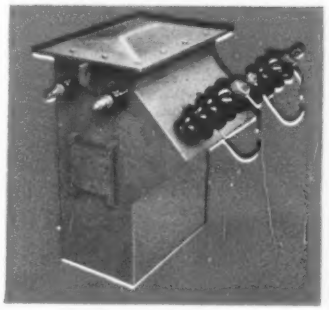


Winding a high-voltage coil as a closed loop core.

PERFORMANCE

	5 kVA	10 kVA	15 kVA	25 kVA	50 kVA
Magnetising Volt-Amperes (approx.)	30	45	60	90	150
Iron loss at normal voltage (watts)	22	38	49	70	125
Copper loss at normal rating 75°C. (watts)	170	300	420	630	1070



15-kVA transformer showing double-gap arcing horns, and bolted-on domed and flanged cover.

Write for Leaflet No. 523.

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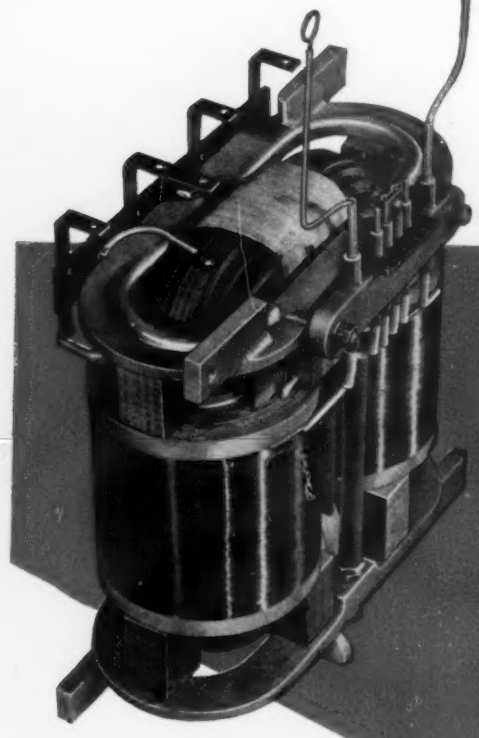

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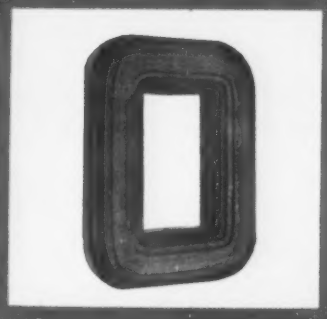

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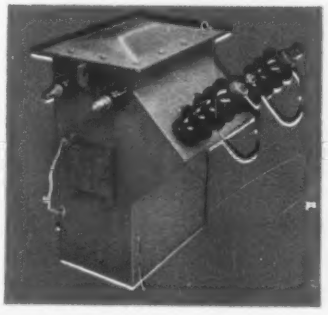

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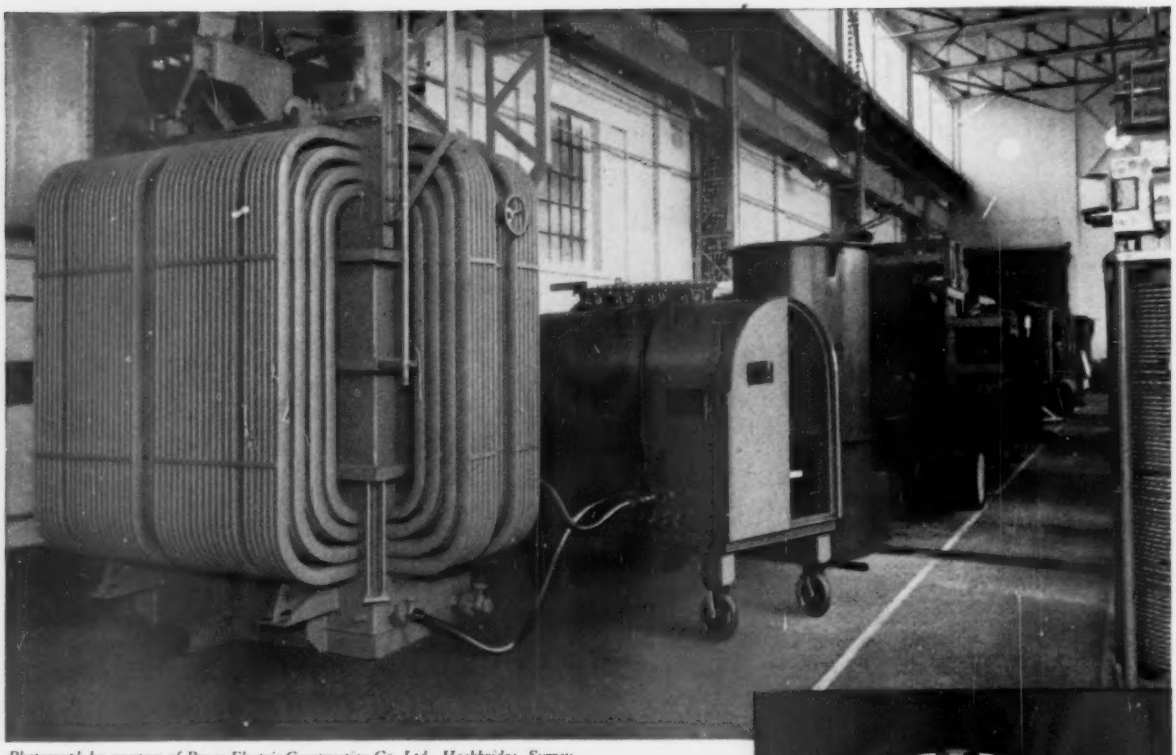

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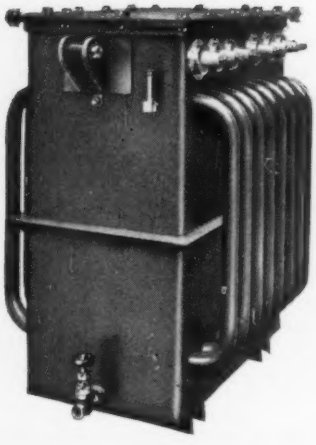

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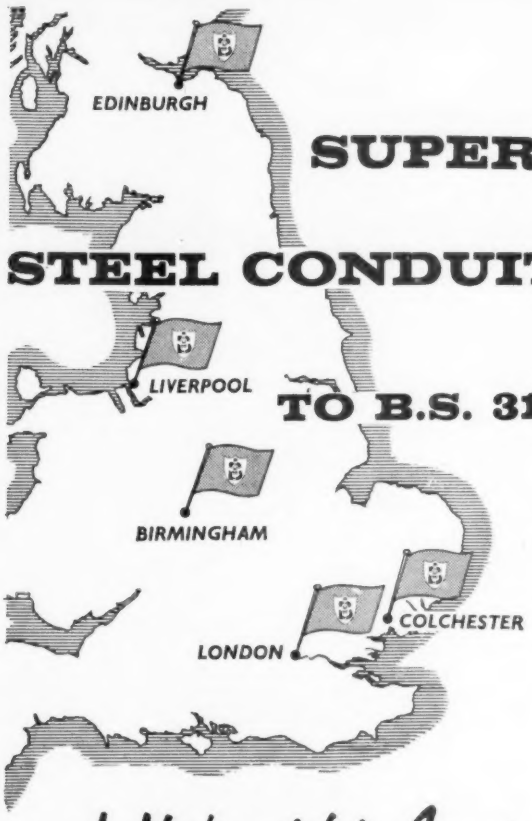

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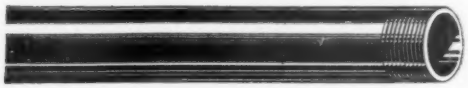

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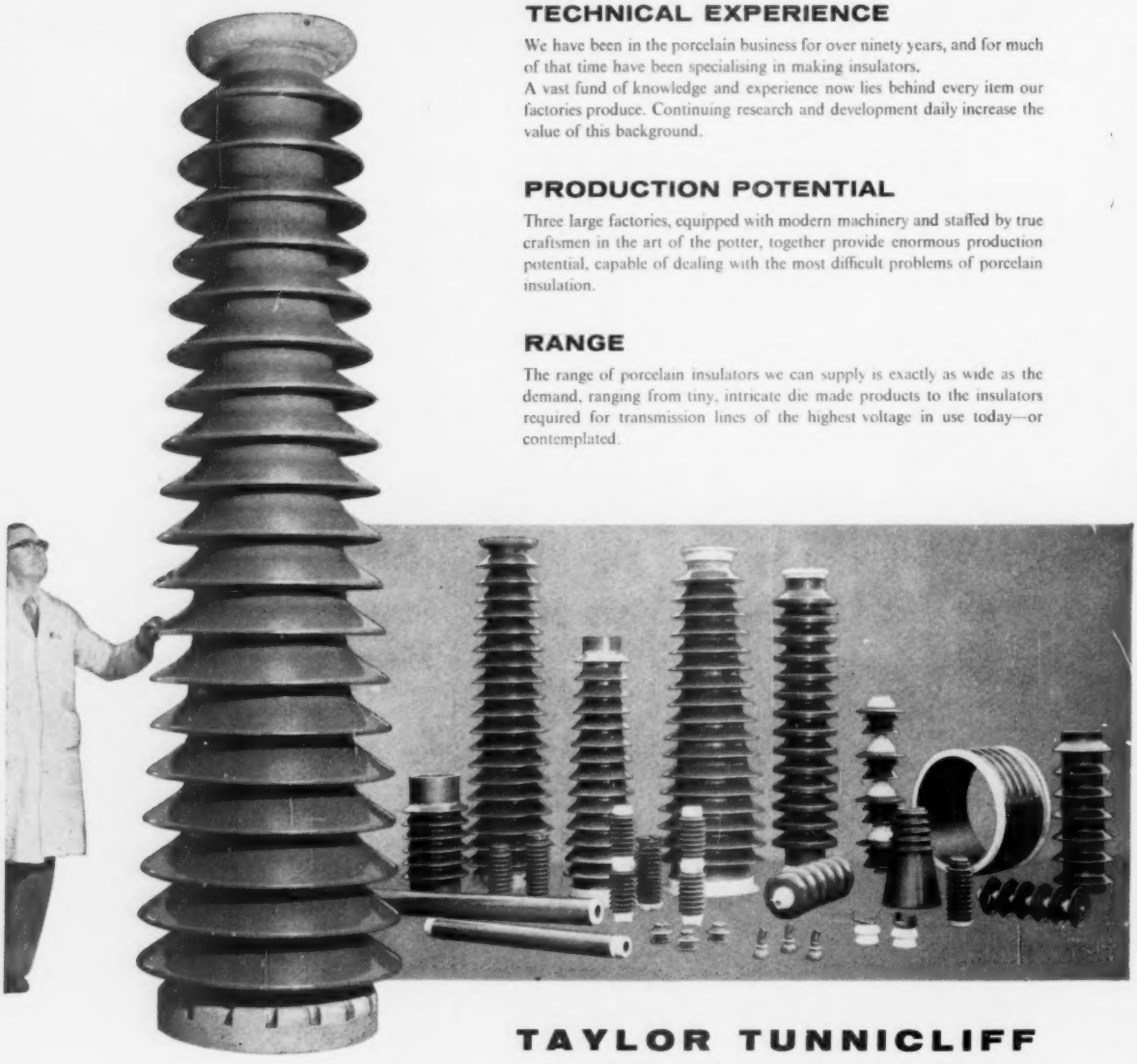

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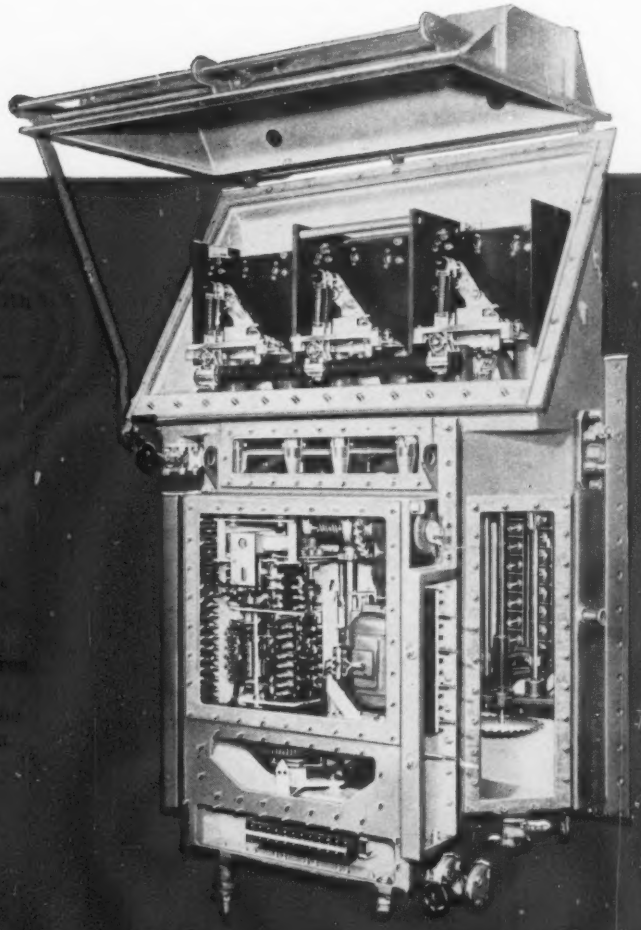

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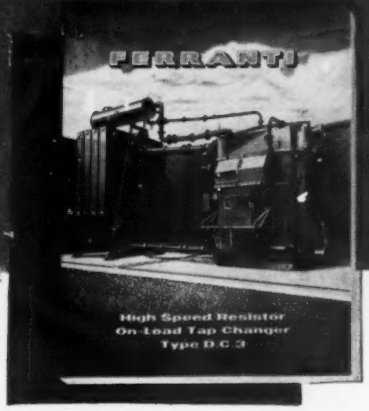

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Electrical Times, 30 June, 1960

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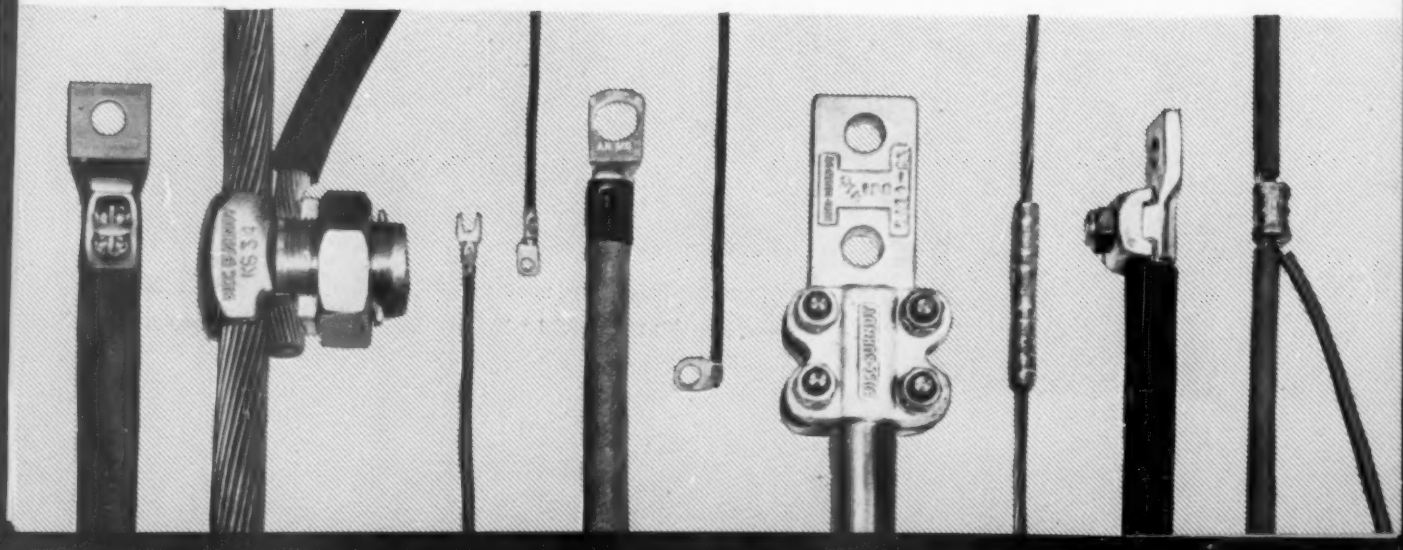

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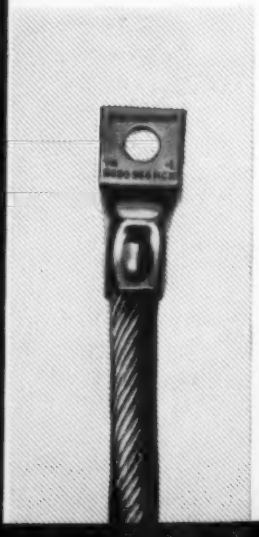

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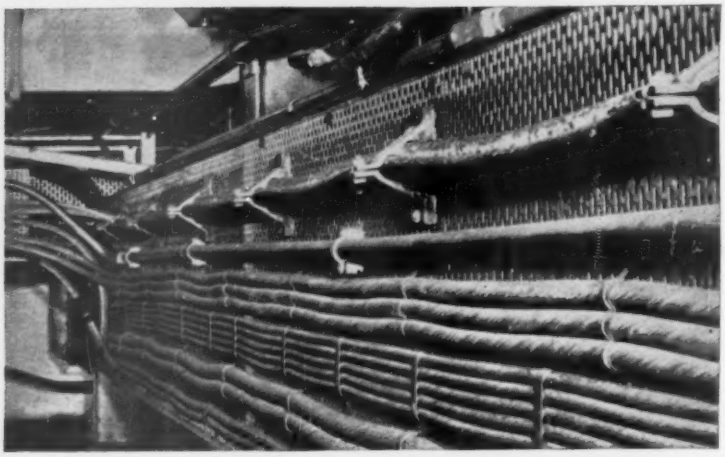

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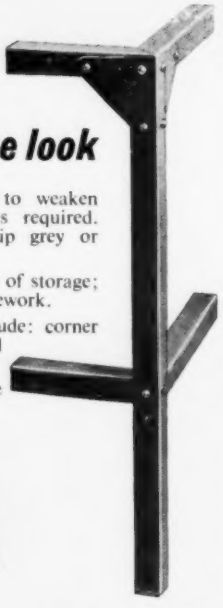

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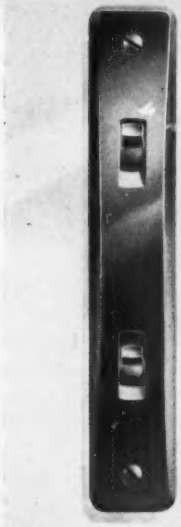

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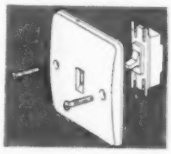
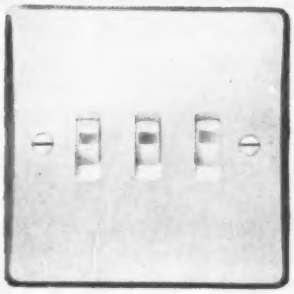


PLASTER DEPTH SWITCH ASSEMBLY



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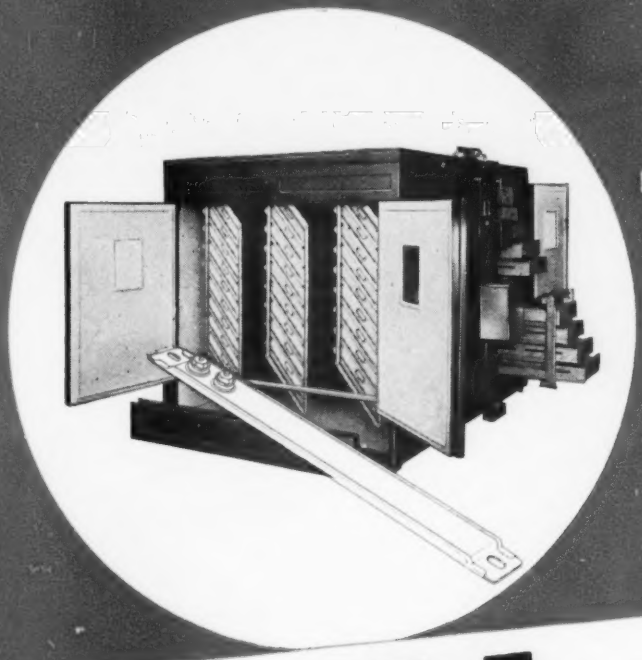

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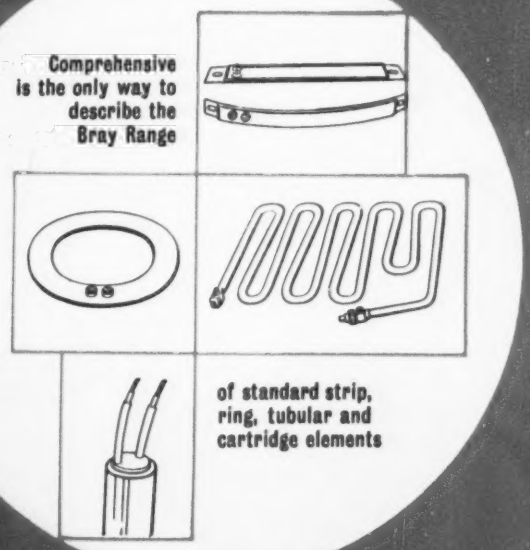

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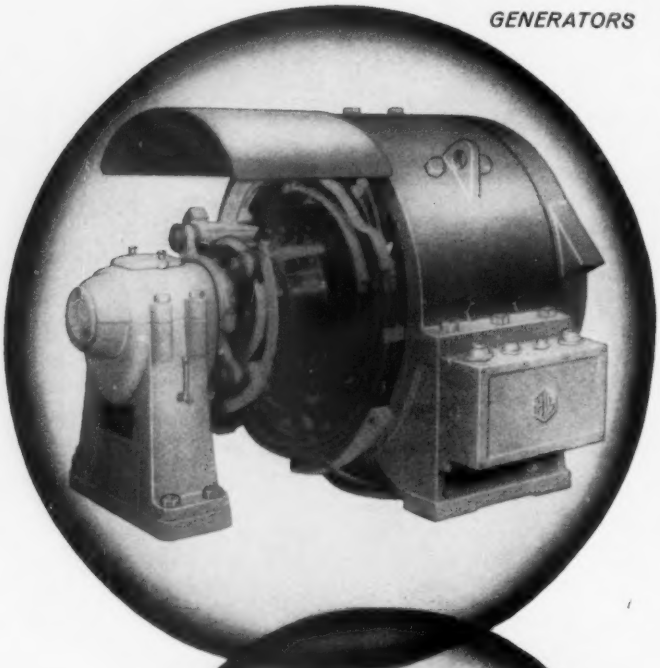
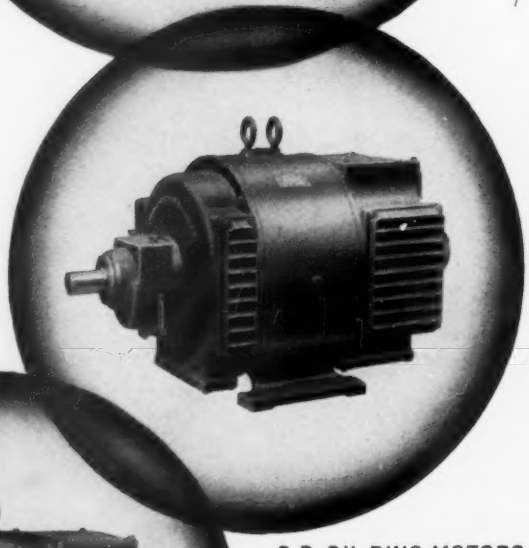


GENERATORS



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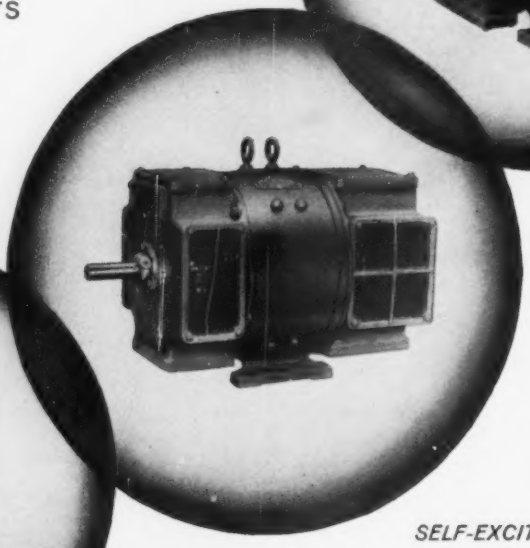

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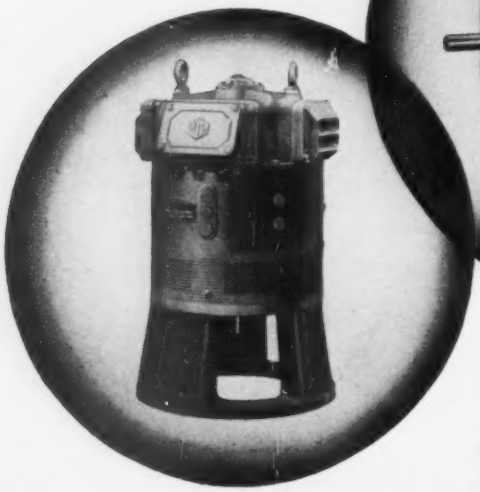

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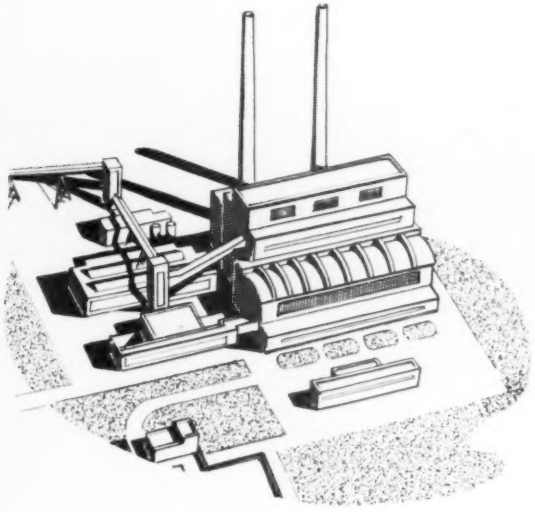
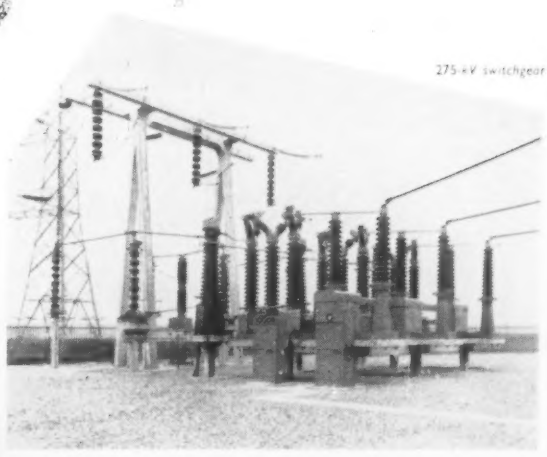
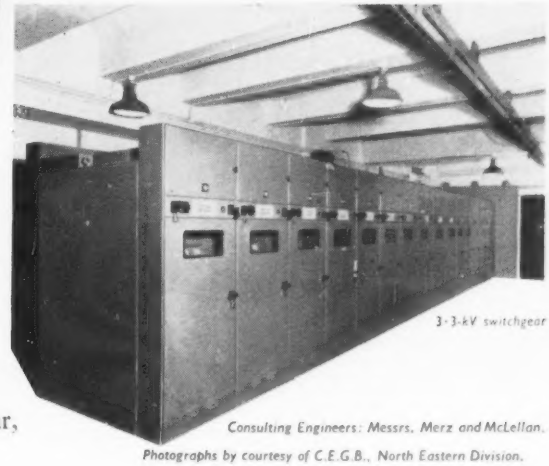


Blyth A
GENERATING STATION



275-kV switchgear

Main control-room



3·3-kV switchgear

Consulting Engineers: Messrs. Merz and McLellan.

Photographs by courtesy of C.E.G.B., North Eastern Division.

Reyrolle supplied the 275-kV air-blast switchgear, 66-kV small-oil-volume switchgear, 3·3-kV air-break auxilliaries switchgear, and 415-volt distribution gear together with associated control-equipment.

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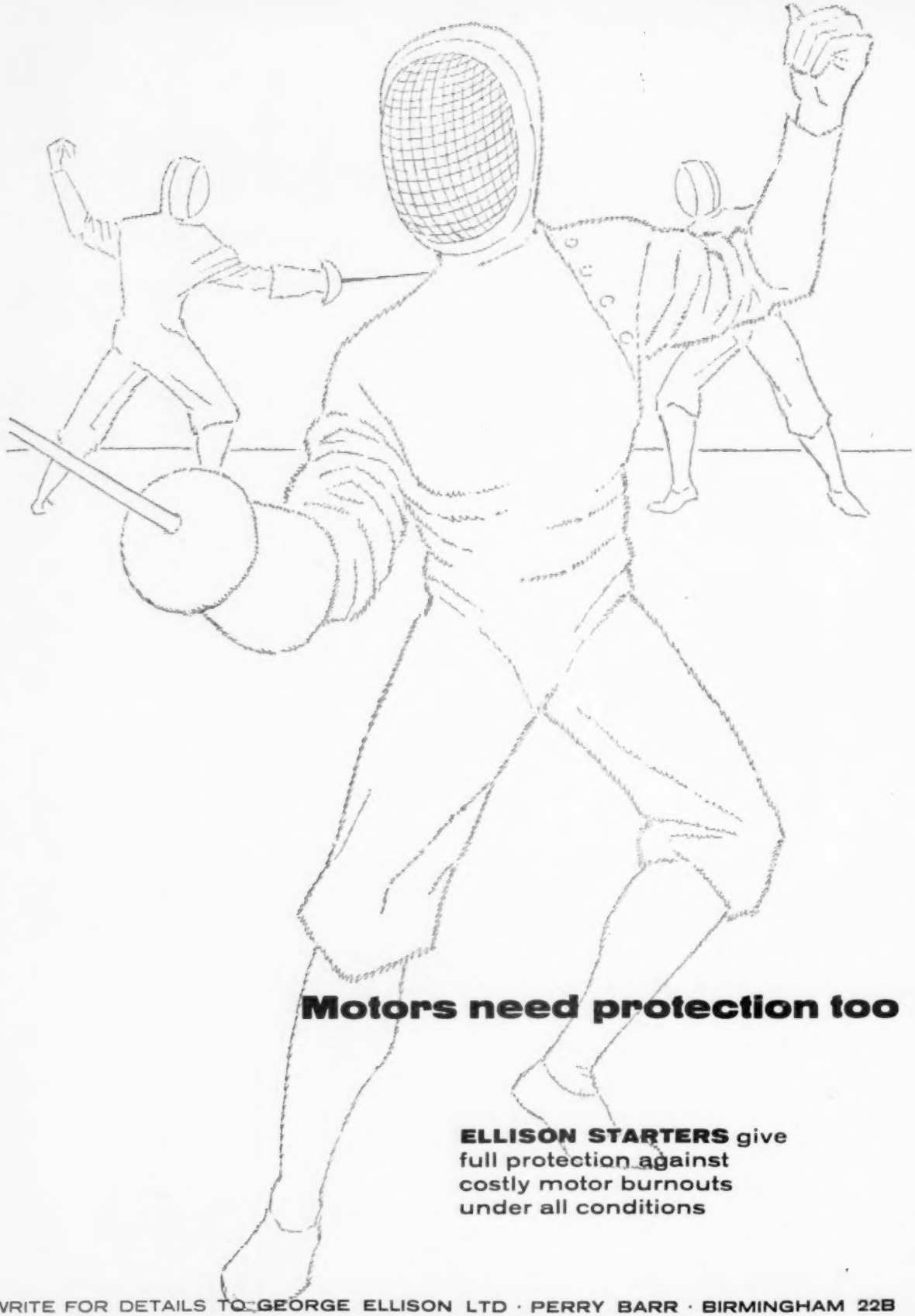

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THURSDAY 30 JUNE, 1960
Registered as a Newspaper Volume 137 No. 26

ELECTRICAL TIMES

SARDINIA HOUSE, SARDINIA STREET, LONDON, W.C.2
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Dans ce numéro

La Centrale Thermique de Blyth "A" 1039
La construction d'une centrale thermique de 480 MW, a été achevée à Blyth "A", la semaine dernière, avec la prise en charge du quatrième turbo-générateur de 120 MW. Les groupes générateurs sont conçus pour fonctionner dans les conditions de vapeur pour vannes d'arrêt de turbine suivantes: 105,5kg/cm² à 538°C, avec resurchauffe jusqú' à 538°C. La chaudière de chaque groupe est chauffeé au charbon pulvérisé, et consomme 390 tonnes/heure. Le premier groupe à été pris en charge il y a dix-huit mois, et, au cours de l'anneé 1959 (à la fin de laquelle trois groupes étaient en service) on e atteint le vendement thermique global de 33,8%, soit le plus élevé pour le Royaume-Unis, on a commencé, sur le même site, la construction d'une seconde centrale, d'une capacité nominale de 1250 MW.

Progrès dans les Câbles à Haute-Tension 1047
On a étudié au Cours de la Conference du CIGRE, tenue à Paris, d' importants progrès réalisés dans les techniques des câbles à haute-tension. On dispose de plusieurs méthodes de refroidissement par circulation forcée d'eau ou d'huile, pour les câbles allant des générateurs aux transformateurs, et pour des câbles de plus grande longueur. Les avis diffèrent sur les avantages des circulations d'huile à haute et basse pression, mais on estime généralement que l'aluminium et les isolants plastiques sont les matériaux du futur en ce qui concerne les câbles. Cet article vend aussi compte de la discussion sur l'éclairage.

Train Diesel-Electrique 1051
Les types de trains à unités multiples, les plus récents en Grande-Bretagne, sont les premiers dans ce pays, à être équipés de moteurs de traction complètement montés sur ressorts. Chaque train de six à huit unités comprend deux motrices, chacune possédant un générateur à moteur diesel de 650 KW.

In dieser Nummer

Kraftwerk BLYTH A 1039
Mit der Inbetriebnahme des vierten 120 MW-Turbogenerators wurde vorige Woche das für eine Gesamtleistung von 480 MW geplante Kraftwerk BLYTH A fertiggestellt. Alle vier Generatorsätze werden mit einem am Absperrventil gemessenen Tubinendampfdruck von 105 kg/cm² bei 538° C mit Wiedererhitzung auf 538° C betrieben. Der jedem Satz zugeordnete Einzeldampfkessel ist für Staubkohlenfeuerung konstruiert und hat eine Nennleistung von 390 t/h. Der erste in diesem Werk errichtete Satz steht bereits seit 18 Monaten in Betrieb. Ende 1959 verfügte das Kraftwerk über drei in Betrieb stehende Generatorsätze. Der im Jahre 1959 verzeichnete thermische Gesamtwirkungsgrad beträgt 33,8% und stellt den höchsten bisher in Grossbritannien erzielten dar. Die Errichtung eines zweiten, für 1250 MW ausgelegten Kraftwerks auf dem gleichen Gelände wurde bereits in Angriff genommen.

Technische Fortschritte auf dem Geliet der Hochspannungskabel 1047
Ueber wichtige Fortschritte in der Hochspannungskabel-Technik wurde auf der CIGRE-Konferenz in Paris berichtet. Diese betrafen u.A. die Zwangskühlung mit Wasser bzw. mit Oel, die Verwendung direkter Kabelverbindungen zwischen Generator und Transformator und die Verlegung längerer Kabelstrecken. Die Meinungen erwiesen sich als geteilt in bezug auf die Vorzüge einer unter Hochdruck bzw. unter Niederdruck stehnder Oelfüllung, doch weitgehend einig darüber, dass Aluminium und: Kunstoffe die hauptsächlichen Kabelwerkstoffe der Zukunft bilden werden. Der Artikel enthält auch eine Zusammenfassung der über Blitzschutz geführten Diskussion.

Dieselelektrischer Fahrbetrieb 1051
Die neuesten in Grossbritannien eingeführten Dieselzüge mit Mehrfachantrieb weisen die ersten hier eingebauten, ganzlich federabgestützten Fahrmotoren auf. Es handelt sich um Züge zu je sechs bzw. acht Einheiten mit je zwei Triebwagen bestruck mit 650 kW-Dieselgeneratorsätzen.

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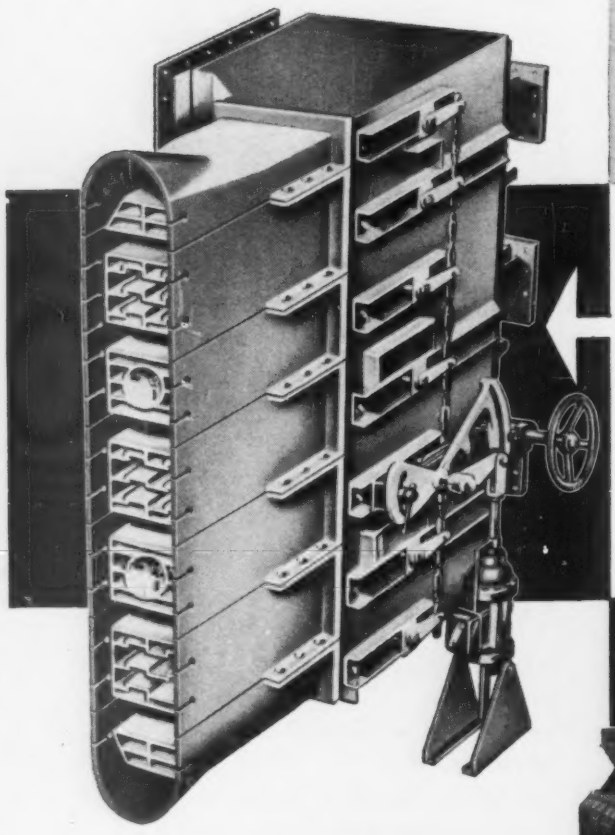
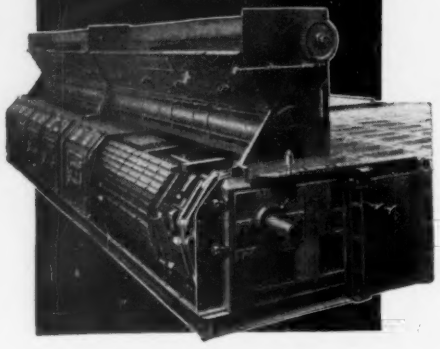


Burner
or
Stoker?



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ELECTRICAL
TIMES

ESTABLISHED 1891

THURSDAY, 30 JUNE, 1960

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Comment

STEPPING UP CABLES

High-voltage cables are entering a new phase of development as demand arises, not only for ratings of ever higher voltages, but of higher current values also. Against this background the discussion at CIGRE was one of the most interesting of recent years, perhaps the best of this year's conference. Forced cooling of cables by water or oil is one of the more promising recent developments. It appears to offer an economic solution to problems such as connecting generators to their transformers; one which is becoming difficult with capacities of single machines now under construction ranging up to 350 MW. However, water cooling is now also being used for long runs of cable in order to increase their loading; to what extent such methods are likely to become more general will be governed by economic factors of installation cost and I^2R losses. In the highest voltage ratings, with cables now ranging up to 500 kV, clearly the time is overdue for a new look at dielectrics. A great deal is to be hoped for from the cable built up of plastics tapes instead of paper, even though much investigation remains to be done. The higher cost of such insulation may well be justified for the highest voltage ranges. One speaker suggested 220 kV as a lower limit, but on economic grounds paper still has a strong following. In lower voltage ranges a solid dielectric appears to be indicated if plastics is to be competitive. Unfortunately, the meeting offered little hope of new developments in this connection.

ELECTRICAL ASPECTS OF E.C.M.

Whatever may happen about the "Outer Seven" European Free Trade Association, the British electrical manufacturing industry has a vital interest in trade with the "Six" of the European Common Market. That is why BEAMA commissioned a study of electrical aspects of ECM countries, resulting in the 60-page survey which is noted elsewhere in this issue. The claim that this is probably the first comprehensive survey of its kind to be undertaken by a trade association is a proud one, and the survey can unhesitatingly be welcomed as a valuable working tool for British manufacturers. However, they must not expect it to answer all their questions about trade with ECM members. Its scope is more limited, an economist's examination of electrical trade prospects over the full range from large capital goods to domestic equipment. The evidence supporting the predictions made for expansion of trade to the impressive aggregate of £14,150 million in the electrical sector in the five years up to 1963 is fully set out, but it might have eased interpretation if comparative predictions for the British market had been included. Again, it would

have been useful to have more notes on trading practice in each of the countries concerned, indicating the proportions of goods following the various possible commercial routes from manufacturer to customer. But the value of the document as it stands is great, for the manufacturer willing to study it closely in the light of his own information and plans. As an example of the working out of BEAMA's policy to provide its members with an increased amount of working information it is a most highly promising pledge for the future.

FLOOR-WARMING AT HOME

The interest of electrical contractors in electrical floor-heating is natural, for the work of installing such a system is theirs to a degree that is true of no other heating method. Yet the discussion of floor-heating as the main technical subject at the annual ECA conference provides an occasion for questioning whether contractors are doing as much as they might to forward the popularity of this form of heating. Although conclusive statistics are hard to come by, the general impression is that contractors are putting no great effort into selling floor-heating: most of the endeavour remains with the manufacturers and the area boards. Contractors have a valuable field of opportunity in the medium-sized commercial building and still more in domestic premises generally. What holds them back? Perhaps a little uncertainty about the reliability of the claims made for this heating technique, although that should be disappearing now in the face of so much favourable evidence from working installations. Also, no doubt, some unhappiness about having to be so dependent on manufacturers for design of the installation to meet given conditions of comfort. In the latter respect there is encouraging evidence that as the early uncertainties of design are being eliminated through experience, technicians of good ONC level can handle run of the mill heating calculations without great difficulty, and an authoritative design code is promised soon. That should enable the contractor willing to put an effort into promoting floor-heating to become reasonably independent of particular manufacturers. With less concern about fighting for off-peak demand (not always appropriate in floor-heating) than area board installation staffs, the contractor who wants it can establish a good connection in this specialised branch of heating installation work.

DIP. TECH. IN THE WORKS

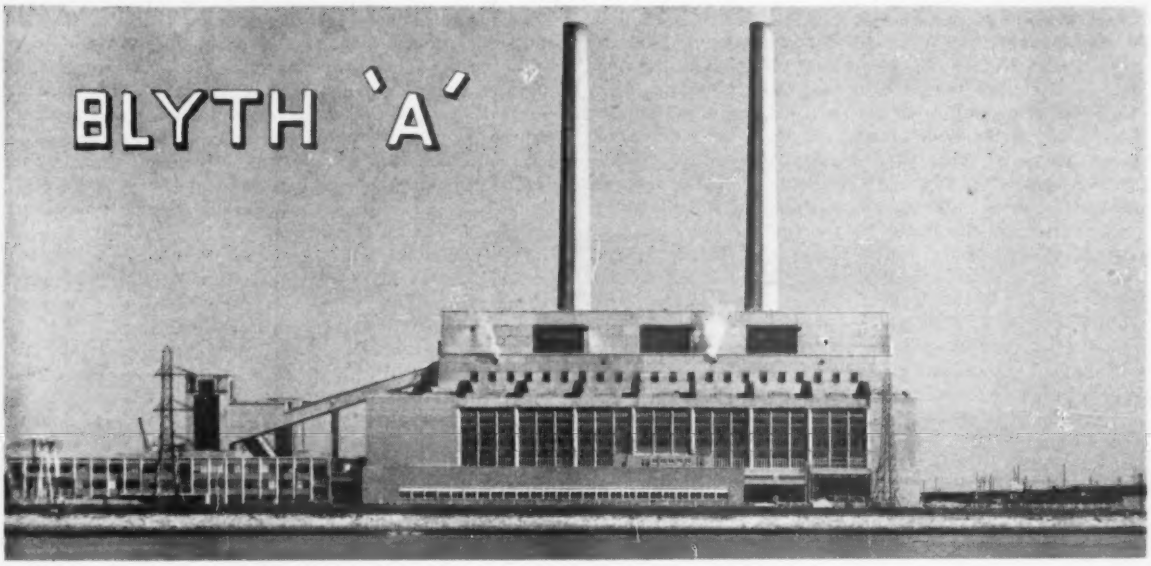
The special character distinguishing the Diploma in Technology from an engineering degree is the closer association with industry throughout the sandwich course which the diploma student follows. Although the first care of the National Council for Technological Awards had to be establishment of academic standards, it was made clear from the beginning that they planned to look critically at the industrial training as well. Now that step is being taken and a memorandum published along with the council's annual report shows that, predictably enough, the general guide is to be compliance of the works training course with what is required by the appropriate professional institution—but with one additional factor. The training scheme has to tie-in closely with the academic studies; and in general, if an existing course does not correlate well it is the works training course that the National Council expects to be modified. In all of this, the council is apparently forced to take the colleges largely on trust; it confesses that it will not be able to study closely every training scheme. This somewhat offsets the brave words that introduce the subject yet, provided there is the level of loyal co-operation that can be expected from the colleges, this lack of a rigid standard is no doubt wise. The number of people studying for Dip. Tech. is rising fast and the shortage of training opportunities is a limiting factor, especially for students who are college-based rather than firms' student apprentices.

OTHER PEOPLE'S RETAIL TROUBLES

Difficulties in retailing electrical domestic appliances are well in the news this week with more expensive credit intensifying a slow-down in appliance purchase apparent even before the h.p. restrictions. But Britain has no monopoly in this field: comparable troubles are making headlines in North America as well. Reports from both America and Canada bring stories of unhappiness in the domestic appliance industry, with earlier hopes of continued expansion of sales blighted. In the USA it seems to be refrigerators that are the main weakness. Stocks built up in anticipation of a surge forward in buying are hanging fire at all levels and tentative attempts to rectify matters through price cuts are not bringing in the customers. Part of the blame for this problem is attributed locally to a slow-down in house building. The electrical way of living is so accepted in the USA that major appliances are included automatically in new homes as part of the facilities the builder provides. So a drop back in new building affects electrical sales directly. In Canada, much vaunted by the opponents of resale price maintenance as the country which made RPM illegal, it is "disorderly retailing" which is taking the hammer for growing stocks and falling sales. Canadian electrical manufacturers have been under attack for supporting the retailers who take the lowest gross profits even though these do little to offer service to the customer, or to attract custom through attractive premises. This is said against a background of fast-rising sales of electrical appliances through department stores; so it has full relevance to the retailing situation in the UK. At a time when the manufacturer's right to individual RPM is under study in the UK, this transatlantic experience should be taken into account.

Meteor

This week's quick summary of electrical news faces advertisement page 20.



OFFICIAL OPENING MARKS COMMISSIONING OF 4TH SET

WITH the commissioning last week of the fourth 120 MW turbo-generator at Blyth "A," the stage was set for the official opening ceremony, duly performed by Mr J. C. Mitchell, O.B.E., A.M.I.MECH.E., M.I.E.E., former Controller of the NE Division, CEGB, on Wednesday, 29 June. The station has already achieved a place in electrical history by being the first to commission a 120 MW reheat unit in the UK, having beaten Kincardine to the post by a matter of a few days in December, 1958. In its first year of working, during which two more 120 MW sets were commissioned, it added to its laurels by notching up the highest thermal efficiency, 33·88%, of any station in Britain or Northern Ireland, and already Blyth "B" is taking shape alongside. This will house two 275 MW sets and two 350 MW sets when completed some time in 1965, giving a total plant installation of 1,730 MW and making Blyth one of the largest generation developments under construction in Great Britain

The Station Site

Blyth power station is situated on a 241 acre site close to the sea and mouth of the river at Blyth harbour. Actually, it is on the northern peninsular cutting the Bedlington-Cambois road in the centre of a heavily worked colliery area. No workings extend below the site of the station, which rests on a 70 ft thick layer of strong boulder clay overlying the coal measure sandstone, the weight of the foundations and superstructure having been so distributed as to completely avoid any risk of subsidence either now or in the foreseeable future. At this point many of the mine workings extend out under the sea.

Despite the fact that the stations have a number of coal mines in the close vicinity and that the furnaces have been designed to burn Northumberland steam smalls from local sources, the tremendous consumption of coal—50-55 tons per hour for each of the present sets at full load and around 120 and 150 tons per hour for the larger sets at Blyth "B" when completed—has necessitated the creation of extensive sidings and coal storage facilities from which the fuel is transported to the furnace bunkers by belt

Dates of commissioning, Blyth "A"

Set No. 1	December 1958
Set No. 2	June 1959
Set No. 3	November 1959
Set No. 4	June 1960

conveyors. For the "A" station there are 32 reception sidings and a further 16 will be installed for "B" to give a total siding length of 25 miles. No comparable siding capacity is available on the British Railways system in the area and diesel locomotives are used for handling the wagons, which are mainly of the bottom dumping pattern. A tippler is also provided for the occasional side dumping wagon in the trains.

From the filler pits the coal is transferred by belt to a conveyor tower, from where it is directed, also by belt conveyor, either to the station bunkers or to the stocking-out area. A tower adjacent to the station serves as a distribution point both to the existing plant and the future "B" station. In the stocking area, coal is discharged by travelling stacker and distributed by bulldozers which also assist in reconveying the coal back from store to the belt line in conjunction with a travelling reclaiming transporter. Control is centralised at two desks, one in each of the towers.

Boiler Plant

In the boiler house, the fuel is transferred to the four station bunkers, each of which has a capacity of 2,000 tons and is 85 ft long by 30 ft wide by 54 ft deep. An unusual feature of these is the construction which comprises a ¼ in. thick steel skin plate hanging in a free catenary shape when fully loaded. At lesser loads distortion is prevented by internal spacers.

The boilers, of Babcock and Wilcox design and construction, have an evaporative capacity of 860,000 lb steam per hour at 1,600 lb/sq in. and 1,010°F superheat with a feedwater temperature of 445°F. They are suspended from heavy welded plate girders 9 ft 6 in. deep and spanning 50 ft at a height of 150 ft above ground and are

supported on 100 main columns, each of which is a hollow welded plate box 3 ft by 4 ft and varying in thickness from 0·5 in. to 2 in. Primary steam raising is in the mass of 3 in. dia tubes lining the furnace walls, presenting some 16,750 sq ft of surface to the radiant heat of the burning fuel. Leaving the boiler drum, the steam passes through three banks of tubes, the primary superheater, with a surface area of 18,875 sq ft and situated in the rear gas pass of the boiler, the radiant superheater, which receives heat both from the flames in the furnace and hot gases leaving it and has a surface area of 3,700 sq ft, and, finally, the secondary superheater with a surface area of 15,000 sq ft, from which it passes to the turbine stop-valves. The reheater is also located in the rear gas pass of the boiler and dampers, in conjunction with a by-pass for furnace gases, enable regulation of both superheat and reheat steam temperatures to be effected.

Each boiler has 20 horizontal flame, circular type p.f. burners ignited by 12 pressure atomising oil burners, which in turn are provided with automatic spark ignition, remote controlled. The oil burners will fire the boilers on their own up to 10% maximum continuous rating. The oil, stored in two 40-ton tanks, is heated before spraying into the furnace at a pressure of 350 lb/sq in. Coal from the bunkers is pulverised in ball mills, of which there are five to each boiler, each with a pulverising capacity of 15 tons/hr and are driven by 160 h.p. induction motors. Four mills running are sufficient to maintain the boiler at full output.

Feed Water and Draught Fans

The manner in which the feed water to the boilers receives its initial heating gives an indication of the sources of high overall thermal efficiency of the station. Water from the hot well, together with make-up water obtained from the town water supply through a demineralisation plant, first passes through a drain cooler, where it picks up heat from the hot water drains, then through a low-pressure heater, coupled to a bleed in the low-pressure stages of the turbine, through a gland heater, where steam leaking from the labyrinth glands on the turbine shaft adds more heat, through a second low-pressure heater and, finally, through a combined de-aerator heater, where more bled steam heat is added and entrained air and gases are removed.

The de-aerated water is passed through two 850 h.p. booster pumps and a high-pressure feed water heater before being injected into the boilers, via the economiser, by two 2,650 h.p. main feed water pumps.

Air for combustion is provided by two 370 h.p. forced-draught fans which draw air from the warm area at the top of the boiler house, down through the hollow supporting columns, at a rate of 145,000 cu ft/min and forces it through a horizontal air heater in the boiler flue and into the furnace. Two induced draught fans in the furnace outlet flues extract the gases at 270°F, and at the rate of up to 225,000 cu ft/min, and, after drawing them through the dust collector and precipitators, discharges them up the 450 ft high chimneys. The fans are driven by two-speed motors giving outputs of 800/435 h.p. The electrostatic precipitators are of Lodge Cottrell design and the mechanical dust collectors, four to each boiler, are of the cellular pattern.

Technical Details—Blyth "A"

BOILERS	
No. per set	One
Type	Single drum, radiant, reheat
Rating	860,000 lb/hr
Safety valve setting	1,950 lb/sq in.
Stop valve pressure	1,600 lb/sq in.
Feed water temperature	445°F
Final steam temperature	1,010°F
Reheat rating	780,000 lb/hr
Reheat temperature	697-1,005°F
Reheat pressure	422 lb/sq in.
Firing	p.f. and oil
Mills, per unit	5
type	Ball
capacity/hr	15 tons
No. of p.f. burners	20 per boiler
No. of oil burners	12 per boiler
Cal. value of coal	10,250-10,750 B.Th.U.
Type of oil	Heavy, pressure atomised
Fans, forced draught	2 per unit
capacity, each	145,000 cu ft/min
Fans, induced draught	2 per unit
capacity, each	225,000 cu ft/min
TURBO-ALTERNATORS	
No.	4
Cont. max. rating	120 MW
Speed	3,000 r.p.m.
Turbines, type	3 cyl. double flow l.p.
h.p. stages	8
i.p. stages	13
l.p. stages	5 per side
Stop valve pressure	1,500 lb/sq in.
Steam temperature	1,000°F
Alternators, voltage	13.8 kV
power factor	0.8
amps/phase	6,250
Exciter volts, main, f.l.	455
,, ,, pilot, f.l.	230
Exciter rating, main	1,850 amps
,, ,, pilot	22 amps
Exciter speed	991 r.p.m.
Hydrogen cooling pressure	30 lb/sq in.
Condensers, no. per unit	2
type	two-pass
surface area	70,000 sq ft each
cooling water	60,000 galls/min each
Final feed temperature	435°F
Vacuum at c.m.r.	28.9 in. (Bar. 30 in.)
Voltage regulation	Amplidyne

Turbines

Each turbine and boiler operates as a self-contained unit, one boiler to one turbine. The turbines, of AEI (Metrovick) construction, are of the impulse type with three cylinders including a double-flow exhaust cylinder embodying a Baumann multiflow exhaust stage. Steam passes through the h.p. and i.p. stages in opposing directions to balance out the thrust of the shaft. The reheat cycle conforms to modern practice, the reheat steam entering the boiler at about 360 lb/sq in. and is raised from 695°F to 1,005°F before returning to i.p. stages of the turbine. Control of the main and superheated steam temperatures within ±15°F is effected partly by the adjustment of the dampers in the flues and partly by the use of spray type desuperheaters.

The turbine exhausts to twin two-pass condensers with a total cooling surface of 70,000 sq ft designed to maintain a vacuum of 28·9 in. when supplied with 3·42 million gallons/hr of cooling water at 53°F. This cooling water is drawn from the river at the ash-handling dock and is pumped through 9 ft dia reinforced concrete culverts by four 1,200 h.p. pumps. After leaving the station, the water is conveyed by a similar culvert 30 ft below road level, across the isthmus of land on which the station stands, to discharge into the North Sea below low-water level. The overall length of the complete culvert system is 4,340 ft.

The Generators

Each of the four generators is hydrogen-cooled at 30 lb/sq in. and generates at a terminal voltage of 13·8 kV. The main and pilot exciters are gear-driven from the main shaft at 991 r.p.m. The main exciter is rated at 485 V, 1,850 A full load and is coupled to the main generator field through an amplidyne automatic voltage-regulating system. At full generator load the exciter current is 1,575 A at 384 V. The pilot exciter is rated at 230 V, 22 A and is manually regulated.

Hydrogen cooling is by four heat exchangers embodied in the stator casing and these are coupled to the main cooling

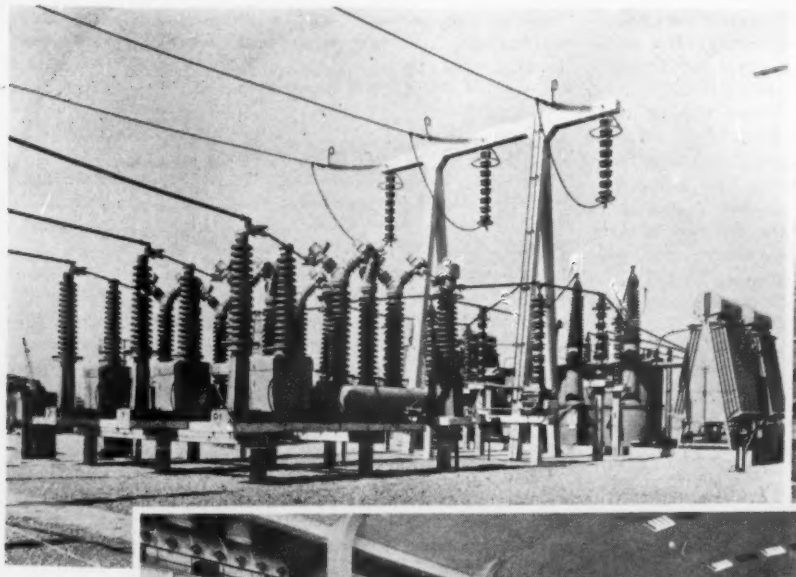
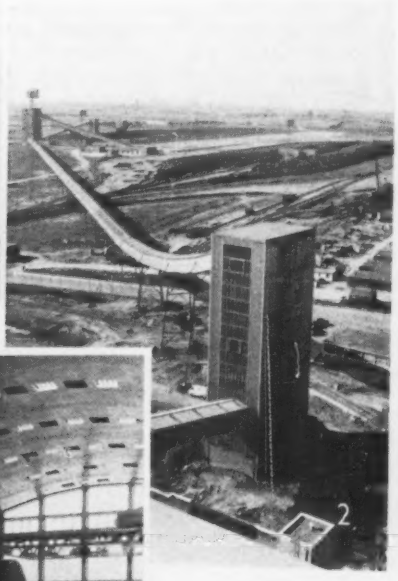


Fig. 1. View of the outdoor 275 kV switching station

Fig. 2. A general view of the coal reception and storage site from the station roof. The tower in the distance receives coal from the sidings and despatches it to the coal storage area, in the background, or the station tower in the foreground



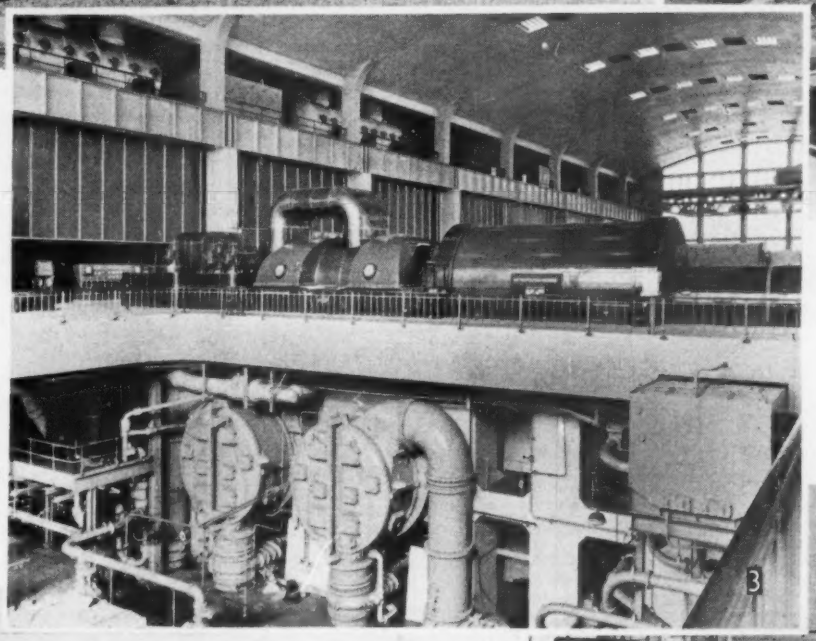
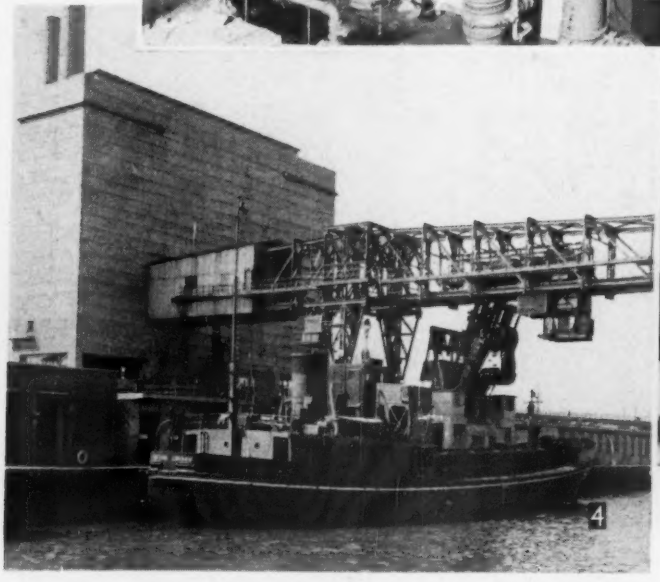


Fig. 3. A general view of the turbine hall with, in the foreground, No. 1 set and its associated condensers. The centralised turbine control desk is to be seen at the left of the turbo-generator

Fig. 4. The ash disposal dock with the dust silo from which ash and dust is being discharged to the ash barge



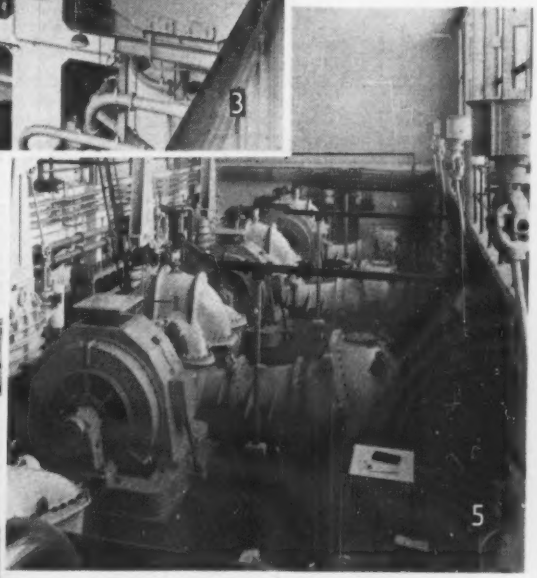


Fig. 5. The circulating water pump house which pumps river water from the ash dock area through the 4,340 ft of 9 ft dia. culverts at a rate of nearly 3½ million gallons per hour

system through distilled water circulating systems. Each generator is solidly connected to the primary of a unit transformer rated at 10 MVA, 13,800/3,300 V for supplying auxiliaries. The main generator transformers for the first three units are rated at 145 MVA and step up the voltage to 66 kV. About 120 MW is fed onto local 66 kV lines, the balance being transformed up to 275 kV at the switching station on the site for export. The generator on the fourth unit commissioned this week transforms direct up to 275 kV. For starting, there are two 10,000 kVA station transformers which draw current from the 66 kV system and transform down to 3·3 kV with further transformers to supply the 415 V system for small motors and lighting, etc.

Control

Automatic boiler control is incorporated on each boiler unit and, in addition, each turbine has its stop-valves and associated controls and instruments centralised at a control desk adjacent to the turbine end of each set. Boiler control and regulation is centralised in two control rooms, each of which handles two boilers and their sets. The output from the station is distributed from the central control room in the adjacent administration block. This also controls the 275 kV switchyard associated with the station on the site.

Main Electrical Equipment Contractors

Turbo-alternators, exciters	AEI (Metrovick)
Generator transformers	Ferranti Ltd.
275 kV switchgear	Reyrolle and Co.
66 kV switchgear	Reyrolle and Co.
3,300 V switchgear	Reyrolle and Co.
415 V switchboards	Reyrolle and Co.
415 V contactor panels	Brookhirst Igranic
Auxiliary transformers	Yorkshire Electric Transformer Co.
Generator and transformer cables ...	B.I.C.C.
66 kV cables	Pirelli General
Pumps and motors	Mather and Platt
Jacking pumps	Tangye and Co.
Passenger lifts	Otis Elevator Co.
Batteries and charging equipment ...	Tudor Accumulator Co.
Boiler control panels	Electroflo Meter Co.
Electrostatic precipitators	Lodge Cottrell
Steam temperature control	Bailey Meters and Co.
Station lighting and heating	F. H. Wheeler and Co.
Standby diesel generators	Brush Electrical Eng. Co.
Electromagnetic vibrators	General Electric Co.
Station cranes	Sir Wm. Arrol and Co.
Station telephones	Standard Telephone and Cables Automatic Telephone and Electric Co.
Coal siding floodlighting	James Scott and Co.
Motors for boiler pumps	English Electric Co.

Ash Disposal

Ash and dust is transferred by conveyor to the ash disposal plant at the ash barge dock. The ash which falls from the furnace is sluiced by a high-pressure water system to the settling tanks from which it is pumped into the ash barge; the dust from the precipitators is transferred, dry, by air into the collecting hoppers, where it is removed by a screw-type pump and blown into the main dust silos at the ash barge dock. From here it is transferred, via air-slides, into the self-powered ash barges which dump the ash at sea beyond the 20 fathom line.

Administration Block

The administration block, which lies adjacent to and west of the turbine house, provides the necessary office accommodation for the station as well as housing the main control centre, chemical laboratories and staff canteens. On the lower floor there is also the lavatories and changing rooms for the manual workers at the station including those in the maintenance workshops which lie behind the administration block. On the top floor there are lecture rooms and conference offices and the block has ample provision for the expanded staff which will occupy the site when Blyth "B" is completed. This building is also the reception centre for visitors to the station.

Across the road from the administration block is the 275 kV transformer and switchyard. Here are situated the two 145 MVA 66/275 kV transformers which form the interconnection between the station 66 kV busbars and the 275 kV lines to Stella West. The 275 kV switchgear is of the Reyrolle air-blast pattern and the 66 kV switchgear is of the Reyrolle small-oil-volume pattern.

The electrical consulting engineers for the project were Merz and McClellan and for the civil engineering Alexander Gibb and Partners. The station superintendent is Mr R. Lott, A.M.I.E.E., A.M.INST.F.

One of the two unit control rooms in which regulation of two boilers and their associated turbo-generators is centralised. A second, similar panel lies to the right of the alarm and intercom desk in the foreground

Mechanical engineering research at N.E.L.

BALL-BEARING NOISE, REVERSIBLE HYDRO SETS INVESTIGATED

NOISE in fractional horse-power motors and the efficiency of pump-turbine sets for pumped storage power stations are projects at two ends of the size range in which the work of the DSIR National Engineering Laboratory impinges on the electrical industry. What the Laboratory, with its main establishment at East Kilbride, Glasgow, is doing in these fields is surveyed in *Mechanical Engineering Research, 1959*, the annual report published by DSIR recently.

Ball-bearing Noise;

A substantial number of f.h.p. motors are rejected because of bearing noise and the Laboratory has been investigating in a general way how noisiness is related to the various dimensional errors that can occur in ball-bearings. A rig has been developed in which ball-bearings of $\frac{1}{4}$ in. bore can be run under various combinations of load at speeds up to 3,500 r.p.m. The rig is quiet compared with even the quietest bearings and it is installed in an anechoic chamber with the driving motor outside.

The noise spectrum from ball-bearings has been found to be complicated, with appreciable scatter in measurements of noise produced by nominally identical bearings. One of the most important dimensional factors turns out to be the sphericity of the balls. Although all balls approximated closely to truth in this respect, sets of balls with departures of the order 20 micro-inches showed an increase in noise level of about 20 dB compared with ball sets with departures of about 5 micro-inches. Departure from circularity of tracks was considerably greater in proportion, but the tracks tested had little significant effect on noise. It was observed that noise level could be increased appreciably by mishandling the bearing when mounting it on the shaft. Bearings sufficiently maltreated produced a high-pitched whine.

Generation Topics

One of the facilities provided at NEL for use by industry is that of accurate measurements on models of hydraulic machinery. Tests of British prototypes of a reversible pump-turbine have been carried out using alternative impellers in the same casing. These tests are claimed to have provided designers with data on performance characteristics and to have indicated outlines of a design technique which will enable good performance to be obtained with both sets of operating conditions. The starting of the unit as a pump has been investigated in detail, since an impeller which performs satisfactorily in other respects may not do so at low flows.

In the high temperatures field, NEL has established a creep information centre, where data on the strength of high temperature materials may be readily available to industrial designers from one source. There has been a favourable response to this project, both from materials manufacturers and from potential users. It is planned that the centre will also collect information on high temperature testing machines and test procedures.

A fundamental problem of importance in power station equipment is that of heat transfer between a pipe and a fluid flowing through it. One of the gaps in existing knowledge concerns the effect of various features which disturb flow, such as bends and abrupt changes of section. This is being tackled at NEL with various pipe configurations.

Machine Tool Control

One of the more immediately exciting developments at the Laboratory concerns the application of interference bands (moiré fringes) to the measurement of small errors in machine tools. Such interference bands are produced when two similar transparent scales or gratings are arranged close together with the lines on the two scales not quite parallel. When there is movement between the scales at right-angles to the lines, the fringes move through exactly one fringe spacing as the lines move through one line spacing. Such movement of fringes can be detected by photo-electric cells, the fluctuations in intensity being nearly sinusoidal, and one cycle corresponding to exactly one line spacing of the scale. By using a pair of accurate linear scales, length or angular movement can be accurately measured; and a moiré-fringe system is a convenient means for converting any change of angle or position into an electrical signal. There is the valuable advantage that the scales do not wear.

NEL is collaborating with industrial firms in the application of this principle to correcting machine tool errors, through a feed-back system. Another instrument is being developed, using a pair of linear gratings to measure the amplitude of very small (0·00002 in.) vibrations at frequencies even below 50 c/s.

One further example of the Laboratory's work may be given; this time from the hydraulic machinery division. A patent has been applied for to cover the invention of a portable annular jack, complete with aiming and supporting structures, which will push small-bore tubes ($1\frac{1}{2}$ in. o.d.) through subsoil to distances of up to 200 ft with an accuracy within ± 1 ft. The jack is operated with a three-stage double-acting hand pump with automatic control between stages. It imparts a twist as well as a push.

NEL Policy

The steering committee for the Laboratory, in their report for 1959, say that they have given priority to a relatively few subjects, so that immediate results may be obtained in them. These are the machine tool field, hydraulic transmissions, and cold extrusion of steel.

The steering committee feel that establishment maintenance of effective collaboration with industry is the greatest single problem facing the Laboratory. Although many of the research facilities at East Kilbride are the most up to date in the world, they will be fully effective only when industrial firms make more direct use of them than at present. The policy is for NEL to be available to some extent to carry out development contracts.

Contractors' opinions

DISCUSSIONS ON RETAILING AND FLOOR-HEATING

DISCUSSIONS of the two papers presented to the annual conference of the Electrical Contractors' Association, at Scarborough last week, fully occupied the time allocated. The wide range of views expressed well illustrated the concern of members with the need to keep up to date—whether with new trading methods, as in the paper on retailing, or with new installation techniques, represented by a paper on floor-warming.

Introducing his paper on retailing (see last week's ELECTRICAL TIMES), Mr N. A. H. Stacey added some information on supermarkets in the USA, which he had collected since his paper was prepared. 98% of these retail outlets sold electric lamps, 60% handled small electrical appliances, and what he called "a small proportion" even sold large electrical appliances.

Retailing Discussion

The discussion on the paper was opened by Mr H. S. Wathes, who thought it difficult to judge the rate at which changes in retailing practice, suggested by Mr Stacey, would take place. Pointers to business remaining in the hands of the smaller traders were encouraging: manufacturers wanted it to be that way. Observation in Australia suggested to him that manufacturers were embarrassed when too much power passed to the multiple concerns. However, electrical traders had no prescriptive right to electrical trading. They needed more self-criticism.

Mr Stacey, replying, largely agreed with Mr Wathes, but he took the opportunity of suggesting that the electrical retailer needed to know more about his potential customers; he needed market research information, and that was probably best obtained for him through his trade association. Once the information was obtained, appropriately designed group advertising could be attempted. Moreover, the present was the age of the pressure group, and the ECA could provide an effective service for members in that field.

Mr H. F. Truman thought the retailer would for some time to come have to suffer rising local authority rates. They could easily swallow up economies the retailer could secure by greater efficiency. While he agreed that the ECA could do much for the retailer, there remained the need for detailed study of all aspects of business detail by the retailer. A point to note was that electricity board showrooms with a turnover of about £1,000/week seemed to spend some £16/week on advertising: it seemed that an increased effort in this way was needed from electrical retailers. Also, electricity boards gave close attention to salesmanship, to wooing customers into the shop and giving them service. He hoped retailers would take advantage of the special h.p. terms, staff training schemes and advice on shop layout which the ECA was arranging.

Mr D. Johnson (Simplex) said that the manufacturer did not want to see the demise of the independent retailer, but he could not protect him from competition. The manufacturer had to offer support to the most efficient retail outlet. There was much strength in the individual retailer's position, gained from local support and the customer's wish for technical advice. He went on to ask what would be the effect on retailing in the future of the pressure to abolish resale price maintenance. Mr Stacey, replying, called RPM a "vexatious subject." It was in the same branch of ideas as monopolies and restrictive practices. Manufacturers, of course, would like to have all their wares displayed at a uniform price. However, a look at the order of magnitude of the problem showed that if all the savings forecast to result from outlawing RPM were achieved, then there would be a saving of only about 1½% in aggregate consumer expenditure in the UK. On the whole, it seemed undesirable to disturb the present price maintenance structure. Any alteration might have a bigger effect on the structure of retailing than politicians imagined.

Mr A. Apps wanted advice on advertising and on what action should be taken about collective groups of non-electrical traders who were "muscling in" on electrical retailing. Mr Stacey expressed himself in favour of cinema advertising for the local retailer, with the opportunity of using local TV and radio programmes kept in mind should these be brought into operation. So far as competition was concerned, he suggested only that retailers should meet it by becoming more obviously efficient than their non-specialist competitors.

Mr G. N. Walker raised the problem of the rebuilding of city centres which could increase rents ten-fold. It was impossible to face such a situation on a gross margin of 10%, while the multiples were taking over 46%. If the individual retailer disappeared, so would after-sales service, and the manufacturer would be faced with that problem.

Importance of H.P.

Mr Stacey, in reply to this point, would not agree that the manufacturer was not looking after the small man. The additional margin achieved by the multiple did not come from the manufacturer—he gave only a few per cent more discount in recognition of the size of order. What accounted for the difference was the enterprise of the multiples in operating a very profitable self-financed h.p. scheme. The small man achieved bigger "stock turn" on a yearly basis. He lost profit because of his mode of operation. He needed more stock control and more conscious effort to maximise profits. Retailers in the UK made bigger profits proportionately than their counterparts in the USA.

Mr P. B. Etheridge (EWF) said that some of the interesting developments in wholesaling and retailing now being investigated by his Association could not be operated with retail price maintenance arrangements as they existed at present. Mr Stacey, in his reply, noted that the EWF was studying the voluntary group system.

In summing up the discussion, Mr Stacey said that

"faith, hope and 50%" were not going to be the answer for retailers. Retailers would have to read about and think about their trade, and trade associations graft new activities on existing ones.

Floor-heating

Introducing his paper on floor-heating, Mr Jackson said it was not possible to produce a rule of thumb basis for design, though the design process need not be complicated. Commenting on general impressions about the technique, he said that too much had been heard of floor-warming being a mainly radiant method of heating. About half the heat output was radiated, half convected, at the usual floor surface temperatures.

When a floor-heating installation was being considered, it was advisable to look in detail at the use to be made of each part of the premises. For example, the carpet department of a large store that was being provided with floor-heating might need special treatment to avoid excessive floor surface temperatures. Schools were only heated by floor-heating on rare occasions in England and Wales, due to Ministry of Education opposition; yet floor-heating for schools was operating successfully in the more difficult conditions of Scotland.

Mr F. W. Blanshard, opening the discussion, said that a screed thickness of 2½ in. was mentioned in the paper. He understood that to the building trade this signified an average figure, subject to a ⅜ in. tolerance. For this reason, it might be safer to work to a screed thickness of 3 in. Turning to manufacturers' designs for floor-heating schemes, he advised contractors always to check any schemes submitted: there was a tendency to approximate too much. On a design point he stressed the desirability of respecting IEE wiring regulations where three-phase supplies were involved.

Mr Jackson replied that screed thickness was largely a question of cost; 3 in. might have some advantages, but 2½ in. was obtainable and was satisfactory. Where blocks of flats had 1½ in. screed only, there was something to be said for operating floor-heating as a direct system (not off-peak storage). In at least one area board it was possible to pay a higher gross rate for units off-peak than on-peak.

Cable Temperatures

Mr C. King said that with embedded systems in industrial premises the factory inspector was likely to insist on an earthed mesh being provided above the heating cable. He thought it important to keep this screen away from the heating cable. For floor-heating systems in flats it should be borne in mind that there would be no clear indication when a fuse blew. For this reason, he advocated the use of miniature circuit-breakers to protect such circuits with ammeters to indicate open circuits. Mr King expressed concern about non-withdrawable installations, so far as possible deterioration of cables was concerned. He thought dielectric temperatures could reach 158°F and higher. There was a lot to be said for ceiling-heating, and in any case, ceiling insulation to restrict upwards heat loss.

Mr Jackson said cable makers indicated that the materials they used would last for ever under the condi-

1, Mr V. Stock congratulates his successor as president of the ECA, Mr C. R. Waterhouse. 2, Mr N. A. H. Stacey presents his paper. 3, Messrs C. R. Waterhouse, L. C. Penwill, C. J. Veness and ladies. 4, Messrs C. King, A. V. Moon, S. G. Leonard, E. A. Cattle, E. Peacop and ladies. 5, Mr R. D. Jackson dealing with a question on floor-heating

tions of floor-heating, but he agreed that temperatures of 180°F could be reached in domestic installations, and said that he would always advise that such installations should be of the withdrawable type. Ceiling-heating, he thought, would have some advantages, but the difficulty of obtaining sufficient head room would be restrictive. An 8 ft ceiling height was too low with surface temperatures of 80°F to 85°F.

Mr A. S. Redvers Pratt thought that to give reasonable service to clients requiring floor-heating work, a contractor should have a heating and ventilating engineer on his staff or work closely with an independent specialist.

Mr H. A. Bamber stressed the opportunity for floor-heating in domestic premises, but thought it might be uneconomical to attempt more than background heating. Mr Jackson agreed, saying that 70°F to 72°F was needed for full comfort heating in domestic premises, and there were usually two or three outside walls. It was often difficult to obtain the general temperature required without exceeding desirable floor surface temperature.

Mr T. F. Pitts inquired about the possibility of floor-warming in older board-and-joist floor property. Mr Jackson said that installations had been carried out, but it was often inadvisable to disturb old floors, and there was difficulty in maintaining good contact between heating cables and floor boards when the latter were replaced in position. Later, he said that wall-heating installations had their uses, but so far as domestic premises were concerned, there were difficulties with the purchase-tax regulations.

Mr E. A. Cattle thought there were difficulties with installations in multi-storey office blocks because of the great amount of other electrical equipment which had to be accommodated in the floor. 12½% to 15% of the floor area could be needed for ducts. However, Mr Jackson thought the problem could always be overcome.

Conference Formalities

The last session of the conference provided the occasion for the installation of the new president of the Electrical Contractors' Association, Mr C. R. Waterhouse. Mr V. Stock, the retiring president, spoke of the evidence Mr Waterhouse had given in the association and also in outside activities of his public spirit, honesty of purpose and lack of self-interest.

At a pleasant ceremony earlier in the conference proceedings, Mr Stock presented the association's gold medal for the best apprentice to Mr R. L. Moody, an employee of the contracting firm, Dale Electric Co., of Filey.

DIP. TECH. TRAINING

WHAT the National Council for Technological Awards wants in the industrial training schemes that students for the Diploma in Technology follow is set out in a memorandum that is published along with the council's annual report for the year ended March, 1960. The council regard it as of fundamental importance that academic study and industrial training, which together comprise a course leading to Dip. Tech., should be as closely related to each other as is practicable. So far as possible, training schemes should satisfy the requirements of appropriate professional institutions, but where firms are already operating training schemes that have been approved by the institutions, there should still be attention to the correlation of training with academic study. The council expect that schemes for industrial training will be modified to secure such alignment if experience shows this to be desirable.

The council confesses that it cannot examine every firm's industrial training scheme, but approval by a professional institution will be regarded as a satisfactory basis. A new decision is that a course of industrial training undertaken wholly before academic studies are commenced will not meet the requirements for Dip. Tech.; previously this appeared a possibility although, in fact, no such courses had been approved.

Supervising Students

The memorandum calls on firms agreeing to provide industrial training in connection with Dip. Tech. schemes to make adequate arrangements for supervision of students and to recognise the right of the council to examine details of the training schemes. The council will make itself available for resolving any problems between firm and college which cannot be solved locally.

In an appendix discussing present practice, the memorandum speaks approvingly of the arrangement that staff visit students during their periods of industrial training. It is thought that an appropriate frequency of visiting is three times during each period of six months in a works. Some colleges also require students to return for a stated number of times during each industrial training period for consolidation of work, direction of reading and discussion of problems which have arisen during the students' private study. Other colleges are not convinced of the value of this practice. While leaving to individual colleges and industry a choice in this matter, the council expresses strongly its opinion that a sandwich course does not need to be supplemented by what amounts to a part-time day or evening course during periods of industrial training.

Annual Report

The annual report of the council speaks of the continuing increase in number of students studying for Dip. Tech. At 31 March, 1960, there were a total of 2,763 students studying for Dip. Tech.(Eng.) in 50 courses, compared with 1,863 students in 35 courses a year earlier. There were 15 courses for electrical engineering with a total of 1,159 students.

The report notes that from 1961, courses will become due for renewal of recognition. In this connection, members of the council will be visiting colleges to see how much progress has been made since the inspection on initial application for recognition. Amongst points to receive attention will be the development of research and consultative work by the staff.

"Parity of esteem" with an engineering degree has always been the stated aim of those promoting Dip. Tech. and the report includes a tribute to examiners for the "efforts they are making to ensure that the final examinations for the Diploma in Technology shall be fully comparable in standard with those for a university honours degree." In this connection, the report notes the requirement that a substantial project, an investigation or the like, shall be included in the candidate's last year.

CIGRE 1960

Lightning and Surges
High Voltage Cables

Continuing our report of the conference on large electric systems, this week we deal with lighting and surges and the larger group on high voltage cables. In the latter section the discussion ranged largely over the artificial cooling of cables and the future of plastics as a dielectric.

Lightning and Surges

ALTHOUGH much was known about lightning discharges, recent experience on e.h.v. lines, particularly in the USA, produced a high rate of faults not explainable by existing data. DR GOLDE (GB) commented that, in a recent study group survey of known facts concerning the two basic parameters, effectiveness of earth wire shielding and effect of lighting current amplitude discharged into such lines, further difficulties had appeared. An important aid to analysis of lightning behaviour was expected to be the recently developed discharge counter used in Scandinavia. Although it had been found that this instrument could not differentiate between earth and cloud flashes, it had already provided valuable information during a survey in those countries.

Extensive lightning studies had been made in the USSR on e.h.v. lines and MR KOSTENKO (USSR) gave some facts which may partially explain troubles experienced in the USA. He said that the number of interruptions, while being dependent on the earth wire angle, was also largely influenced by a probability factor which in turn varied with tower height. He said that while angles of 30 to 35° were suitable for line voltages up to 110 kV, for higher voltages the angle must be reduced to as little as 15 to 20°.

Nature of Lightning Strokes

Recent examination of the lightning stroke by a newly developed cathode ray oscilloscope had revealed striking differences between the leader stroke wave front rise time and that of subsequent strokes. In describing these results DR BERGER (Switzerland), said that the rise time had been found to be as little as ½ microsecond for subsequent strokes. He suggested that the physical effect of such rapid increases in restrike current might be very interesting. MR HYLTEN-CAVALLIUS (Sweden) expressed doubts about the records obtained in view of past examination of lightning surges, but DR ALLIBONE (GB) felt Dr Berger's remarks were quite consistent with results obtained using recording drum cameras. He said the results suggested that surges subsequent to the initial flash may well cause severe stresses on transmission lines although they would be unlikely to damage insulators since an ionised path would have been created by the initial stroke.

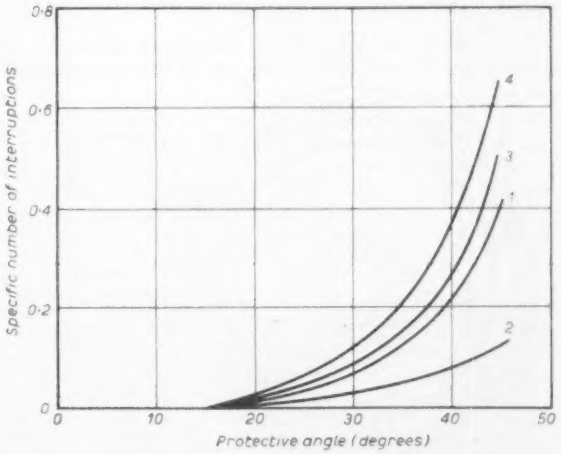
Considerable work is being done in the USA on the natural characteristics of lightning and its effect on system behaviour. MR ABBETTI (USA) referred to Dr Golde's findings on the shortcomings of magnetic test links and described a delay-line apparatus developed to examine lightning wave shapes and installed at present on 20 sites. A shielding failure indicator had also been designed able to differentiate between phase and earth faults and 500 of these were also being installed. Model tests were proving a valuable means of establishing line performance under controlled conditions of artificial lightning discharge.

An important addition to available data on lightning breakdown was contained in the report prepared by MR CASSON (GB) analysing the lightning history of the majority of the world's transmission lines rated above 225 kV. This report showed clearly the importance of earth wires in providing protection against lightning faults and quotes a factor of 10 to 1 for the increased number of failures likely without earth wire protection. It also emphasised the very high performance of single circuit lines with two earth wires.

Surge Counters

Information on the distribution and nature of lightning surges was still needed, but MR JOHANSSON (Sweden) in commenting on their experience with counters impressed the importance of uniform calibration and performance of such counters. Inability of counters to distinguish between types of surges was said to have been overcome in a Belgian design described by MR RICHARD (Belgium).

A condition of growing importance is the manner in which protection against lightning can be afforded to substations connected to overhead lines through cable. Dr Golde suggested that this may now be considered an economic problem, since several papers presented at the session deal with the various engineering aspects. Arrestors give good protection but are expensive and there is still some question of the extent to which they are necessary.



Effect of angle of protection. 1. 220 kV lines on metal towers, single circuit; 2. 110 kV lines on wood poles, single circuit; 3. 110 kV lines on metal towers, single circuit; 4. 110 kV lines on metal towers, double circuit (Burgsdorf)

Referring to a statistical analysis of substation protection on the grid, MR CSUROS (GB) said that out of 500 lightning faults only 7 per cent had resulted in flashover in the substation, and he continued with some comments on the performance of surge protected substation transformers.

High Voltage Cables

THE first subject in the group concerned with power cables was the technical aspects of submarine installations. Two papers were specifically considered, one on the laying of the Channel link, the other concerned with the laying of four submarine cables across the Oslo fiord to give a supply of 300 kV a.c. Length of the crossing was 1,750 metres with a maximum sea bed depth of 200 metres. Of the four cables laid one was spare, but it was proposed to lay two other cables at a later date to provide double-circuit supply. The cable (Fig. 1) was of the oil pressure type. A problem arose from the considerable difference between the air and water temperature in summer, since cable capacity depends on temperature and this would be higher at the shore ends. To avoid limitation of cable capacity by the cable temperature at the shore ends the cables were placed in concrete tunnels running from low water mark up the steep slope to the terminals at both landing sites, these providing cooling by the current of air.

In the discussion, MR DAVEY (GB) pointed out that it might not be possible to lay two cables of 300-400 MW side-by-side as in the Channel link because of their size. In such a case a light cable should be laid alongside the main cable to neutralise the magnetic field. Another speaker, however, questioned the necessity for this step. Mr Davey visualised the possibility of laying 300-400 MW cables in up to 250 fathoms using gas pressure cables of 600 lb/sq in. to prevent water entering on any rupture. He also confirmed that abrasion was less with power cables than telecommunication ones due to the mass/volume ratio. He mentioned the use of anti-twist tapes applied over the armouring, a method used for the Vancouver cable, which could be bent 30° per metre without damage. While most speakers were in favour of anti-twist tapes, it was not always for the same reason, one suggesting they might give rise to difficulties when raising cable, another suggesting that on the Channel link anti-twist tapes will be used to facilitate any subsequent handling.

Artificial Cooling of Cables

Four papers on the artificial cooling of cables led to a lively discussion. While some of the installations were concerned with short generator-to-transformer cable connections, others were put forward for longer cable routes. In this class was a paper by Messrs RALSTON and WEST (Canada) dealing with installations on the Ontario system. These utilised ½ in. or ¾ in. plastics pipes laid in proximity to the cables or drawn into ducts. It was claimed that by this means some 50% increase in load capability of directly buried cables was obtained. Such cables, however, did not have the overload capabilities normally experienced with uncooled cables. Either manual or automatic control of the water could be adopted, the latter being adapted to include detection of leaks. The number of pipes, water velocity and length of the cooling run were matters of economic selection.

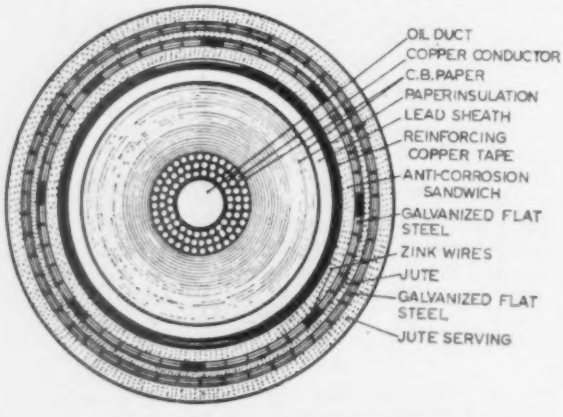


Fig. 1. Oil-filled 300 kV, a.c. submarine cable, 700 A, 0.62 sq in. conductor, 4·45 in. OD

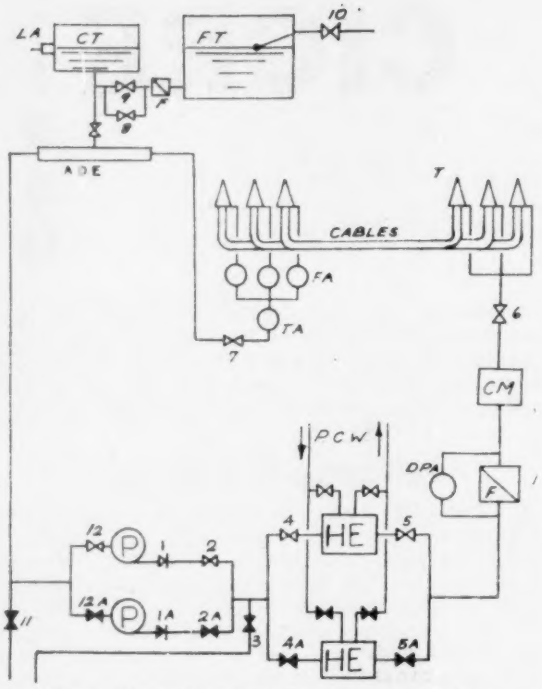


Fig. 2. Water cooling circuit for generator connections

P, pump; HE, heat exchanger; F, filter; DPA, differential pressure alarm; CM, conductivity monitor; TA, temp. alarm; FA, flow alarm; ADE, air detraining enlargement; LA, level alarm; CT, control tank; FT, feed tank; PCW, primary cooling water; T, cable termination; 1-12, valves, white, normally open, black, normally closed

The pipe-line cable lent itself to water cooling and in a paper by Messrs SUTTON and MORGAN (GB) this method was recommended for circuits of several km. In a specimen design suggested for 275 kV the cables were oil-filled, using low viscosity oil with water within the pipe for cooling purposes. The case considered was for a 50% improvement in current rating due to forced cooling. Various methods of supplying the water were considered and it was suggested that a cheap and compact heat exchanger was the principle technical problem for such systems.

In the case of connections between generator and main transformer, currents of the order of 2,000 A have to be carried. In such cases conventional cable systems were unsuitable and even busbars were meeting with increasing difficulties owing to space requirements and precautions against magnetic forces. For such installations water cooled cables were suggested by Messrs HAWLEY, HEWITT and HACKE (GB). The report referred to the original development of water cooled cable for the synchrotron at Glasgow University. This contained a central duct formed by a

helical strip, round which the conductor was stranded. The insulation of the cable was extruded polythene reinforced with double terylene braid.

With this experience, a three-core 20 kV cable had been designed for generator connections, each conductor having its own central duct. Screening was used over the individual cores to prevent possibility of a three-phase short-circuit. The water connection from the earth end of the termination to the high potential end would be made by a coiled p.t.f.e. tube, the length and cross section of which would be adjusted to give sufficiently high water resistance. The accompanying illustration (Fig. 2) shows a typical hydraulic circuit for such a cable. Using moderate pressures over lengths of several hundred metres it was suggested that current capacity of the cable could be increased by a factor of 2 or 3.

High-pressure Oil or Low?

Two years' satisfactory operation of a 500 kV 1,400 MVA cable with forced oil cooling was referred to in a report by MR OUDIN (France). He then went on to describe a 380 kV similar cable. The design of this cable was criticised by MR PALANDRI (Italy) on the grounds of the use of high-pressure oil filling, and he illustrated an alternative design using low-pressure oil. The transmitted power was higher with low pressure for a given cross section and required less lead, but it did need thicker insulation, in view of the use of stress of 15 kV/mm, against 18 kV/mm for high-pressure oil filling. MR BUSS (Germany) referred to areas of higher temperatures in a length of cable. It was here that water cooling could be profitably used. MR ASHFORD (GB) described the water cooled cable at Uskmouth (see the ELECTRICAL TIMES, 16 June). MR BANKS (GB) pointed out that the problem of water cooling was basically economic and the greater losses involved must be capitalised. He referred to a scheme that had been prepared with the following costs:

	Installation cost	Capitalised losses
Normal cable	£17,000	£6,000
Water cooled	£9,000	£53,000

Forced cooling, he said, was practical for short lengths, but the figures showed the main object must be a reduction of losses.

In a paper, MR GIARO (Belgium) gave theoretical and experimental examination of temperature rise of power cables in a gallery with forced ventilation. These led to the conclusion that maximum gain in using a ventilated gallery instead of a non-ventilated one was of the order of 2. In the discussion he gave a reminder that with water cool- in the efficiency falls off exponentially with length.

MR HOLLINGSWORTH gave some particulars of the 330 kV cable installed at Kariba. This was 600 metres long with a vertical section of 175 metres, designed at 11 kV/mm, with aluminium wire armouring. It was of the low-pressure type. Referring to Mr Oudin's paper he said that the author placed a limit of 13 kV/mm on low-pressure cables, but with low density papers now available this limit should be reassessed. It was stable above 20 kV/mm and 500 kV cable could be designed satisfactorily at 15 kV/mm as Mr Palandri suggested.

Cable Expansion

A special study of thermal expansion in relation to 230 kV ducted installation in Vancouver was made in a paper by Messrs BANKS and WOLLASTON. Conclusions were that while an excess movement of a cable into a manhole may occur when long lengths were used, only a small portion of this movement was cyclic and this appeared to come from the 350 ft of cable adjacent to the manhole. Longer lengths of cable would not give greater *cyclic* movement.

Aluminium Sheaths

The cable industry was showing great interest in corrugated aluminium sheaths and a report on such cable was given by Messrs LUCKING and OCHEL (Germany). Manufacture was by an extrusion press of 4,500 tons, the temperature of the aluminium depending on the sheath thickness. The extruded aluminium tube fitted loosely round the cable core and after cooling was corrugated by rolling-in helical grooves by special head immediately behind the press. This gave a cable whose flexibility was limited only by the insulation. Reinforcement tapes were considered unnecessary for high-pressure oil-filled cables and armouring could be dispensed with. The whole cable was finally sealed with a p.v.c. jacket. Since the first installation of a 110 kV cable of this type in 1957 there had been seven other installations. Mr Hollingsworth congratulated the authors on their method but pointed out the disadvantage of the immense size of extrusion press. He felt that aluminium had come to stay for cables. He had adopted corrugated sheath cables but preferred final covering of bitumen with extruded p.v.c. Mr Ochel gave some supplementary information on termination for such cables, the sheath being expanded away from the cable and pressed into a form of flange for attachment to the termination. This type had been tested to 15 atmospheres.

Plastics as Insulation

Surprisingly, perhaps, considerable discussion was aroused by the paper by VOSS and VERNEER (Holland) which brought up to date their work on plastics layer dielectrics impregnated with oil, first reported in 1958. Excellent results were obtained, especially with very thin plastics tapes. The economics of this type of cable were queried by MR MORGAN (GB) who said that although the dielectrics could be operated at higher stresses, the high cost of the polymer tape could not compete commercially with paper. It might have greater advantages in installations where charging currents were an important factor. MR GAZZANA (Italy) also held that paper would not be easily supplanted.

In this twentieth century we were still using moisture hungry materials for our cables, said Mr Wyatt (US), and this report opened a new door to insulating materials. For the future, we had to design the plastics molecule to suit cables he said: one or two million dollars for research would do the job. It was not right to take a bad material and then use, say, pressure, to make it work. He wanted satisfactory material from the outset. Companies in the US were working on this problem. He believed that the future would show the use of plastics layer insulation for cables of 220 kV and above, with extruded plastics insulation for lower voltage use.

Plastics film tape could provide an insulation of 400 kV/mm, but a sample of cable might give only 140 kV/

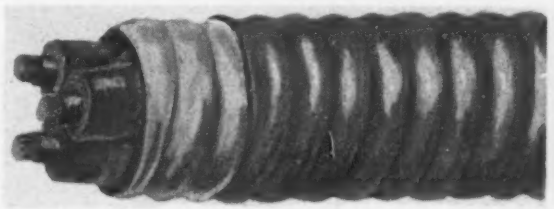


Fig. 3. Three-core oil-filled 110 kV cable with corrugated aluminium sheath and p.v.c. protection

mm. This difference was pointed out by Mr Oudin, and he attributed it to the distortion of the gradient which was not normally seen with paper. MR WILLIAMS (GB) was not sure of the technical approach which should be made to Mr Wyatt's suggestion of tailoring the plastics molecule. He suggested that with the use of plastics tapes, gas filling might be used instead of oil, but cables of that kind would be more expensive. This might be justified if they reduced the losses on which a capital value must be put. This was the reverse of the problem expressed earlier by Mr Banks.

Cable built up of alternate layers of plastics and paper had been made some eight years ago, said Mr Davey (GB), these proved economic and he felt that the time had come when any further progress must be towards plastics; he did not agree with the oil filling of butt spaces as this limited choice of plastics. Under cycling the plastics and oil would expand and tend to choke the oil passages.

The final paper discussed was a joint British one on a practical approach to the assessment of soil thermal resistivity and its influence on cable current ratings.

Europe as an Electrical Market

AN outstanding survey of the market for electrical goods in the six ECM countries has been published by BEAMA this week. The major basis of assessment is the estimated products to be installed by the countries during the five years 1959-63, and this is broken down into countries and product groups as *shown in the table below*. It can be seen that over those five years the Common Market is expected to absorb about £14,000 million of electrical goods, roughly equivalent to ten years of UK output at present production levels. Of the total products required in the five years, it is estimated that 15% will be taken by supply authorities, 32% by industry and mining, and 29% by domestic.

Each group in the main table of the report is subject to detailed analysis, often with tables of estimates based on quantities and supplemented with an account of factors affecting the nature of the market. A further important section is devoted to an analysis of the electrical and general backgrounds of the six countries. In all, 62 tables of statistics are included. The survey was prepared by a specially commissioned economist, Mr A. S. Windett, and is a document that demands the closest attention.

ESTIMATED INSTALLATION BY PRODUCT GROUPS AND COUNTRIES
TOTAL FIVE YEARS : 1959-63 (Value in £ millions)

	Belgo-Lux	France	Italy	Nether-lands	W. Germany	Total	% Increase 1963/58
A.C. Generators	7·81	36·48	23·66	8.26	46·70	122·91	23
Wires and Cables :							
Above 100 kV	2·21	47·65	28·43	1·72	65·82	145·83	19
1 kV to 100 kV	15·36	186·00	130·51	16·10	190·02	537·99	17
Under 1 kV	11·12	118·24	102·43	19·17	129·00	379·96	16
Transformers:							
Station	1·94	17·75	9·86	3·19	14·78	47.52	32
Network	6.46	70 62	72·51	8 92	95·91	254·42	18
User	1·54	21·75	10·92	1·88	25·54	61·63	29
Switch and Protective Gear :							
Above 100 kV	10·46	87·56	58·28	13·60	91·92	261·82	34
Under 100 kV	32·40	329·30	246·33	41·30	289·40	938·73	55
Industrial Equipment:							
Motors and DC Generators	53·10	298·30	128·60	48·20	350·10	878·30	16
Process Heating Equipment	11·93	32·61	18·09	9·36	74·51	146·50	17
Welding Plant	8·91	37·61	18·11	10·41	87·17	162·21	21
Rectifiers and Static Converters	9·25	36·70	21·13	8·80	73·35	149·23	18
Supervisory and Control Gear	17·17	68·37	44·63	13·36	98·12	241·65	35
Miscellaneous	11·50	64·97	39·14	10·63	91·54	217·78	21
Radio and Related Equipment :							
Complete Sets	78·52	324·56	219·34	83·04	438·16	1143·62	40
Other	177·10	726·00	494·00	187·00	989·00	2573·10	86
Communications Equipment	59·52	280·81	225·03	68·42	427·53	1061·31	40
Domestic Equipment	81·70	525·40	269·80	150·70	867·70	1895·30	47
Commercial Equipment	7·04	92·30	55·00	5·50	69·70	229·54	40
Domestic Lighting Fittings	6·96	37·95	35·24	8·35	42·09	130·59	18
Other Lighting Fittings	0·86	7·36	5·53	0·93	5·75	20·43	28
Lamps	20·17	109·20	90·60	24·30	111·20	355·47	17
Domestic Wiring Accessories	12·37	57·50	55·30	15·29	77·22	217·68	16
Other Wiring Accessories	3·56	21·44	17·29	3·91	18·32	64·52	24
Meters and Instruments :							
Recording	6·04	45·05	50·49	8·48	65·21	175·27	17
Measuring	5·78	55·47	38·16	9·41	72·92	181·74	32
Testing	5·33	25·61	17·42	5·56	37·81	91·73	28
Electro-Medical	10·45	51·33	45·10	12·80	58·65	178·33	18
Signalling Equipment	11·52	38·57	36·02	12·51	44·08	142·70	70
Accumulators and Batteries	32·23	217·64	151·36	39·10	185·55	625·88	56
Insulating Materials	8·81	59·20	33·10	12·20	64·04	177·35	72
Residual	12·16	101·10	71·61	17·21	137·10	339·18	75
Total	741·28	4230·40	2863·02	879·61	5435·91	14150·22	44

Diesel-electric Pullmans

BRITISH RAILWAYS HIGH-SPEED INTRODUCTION

DIESEL-ELECTRIC drives are being provided for five new Pullman trains for BR London, Midland and Western regions. For this project, GEC have supplied ten main power equipments comprising diesel engines, generators, traction motors and drives and control gear. The equipments are designed for a maximum service speed of 90 m.p.h. Diesel engines are being supplied by North British Locomotive Co. Ltd. of Glasgow, and the trains as a whole are built by Metropolitan-Cammell Carriage and Wagon Co. Ltd.

One power car and driving cab is provided for each end of a train, which may be of six or eight vehicles. The car has a radiator unit immediately behind the driving cab, and beyond that the diesel-generator set, consisting of a 12-cylinder vee engine direct-coupled to the main generator, with an overhung auxiliary generator. A bulkhead is provided between engine and generator. The main traction control switchgear cabinet stands against the main end wall of the generator compartment (see Fig. 1) and traction motor field divert resistors are mounted on top of the cabinet, with the generator automatic field regulator resistances in the compartment roof.

Generators and Motors

The main generator is a six-pole machine with a coupling flange at the driving end through which the armature is solidly bolted to the engine crank shaft. A fan mounted on the driving end of the main generator armature draws ventilating air partly through the auxiliary generator and partly through vents. The air passes in parallel paths through the armature cores and over the periphery of the armature and field coil surfaces, being exhausted into the engine compartment. The winding on the main generator armature is of duplex lap design, which is considered to give the best commutation conditions. Generators have the following ratings: main generator 1,700 A, 383 V, 1,500 r.p.m., 650 kW and 1,250 A, 523 V, 1,500 r.p.m., 650 kW; auxiliary generator 91 A, 110 V, 650/1,500 r.p.m., 10 kW.

The voltage output for the auxiliary machine is controlled over the whole engine range by a Newton carbon pile voltage regulator. This generator supplies exitation for the main generator separately-exited field and current for battery charging, control circuits, compressor and oil priming pump motor and cab heating. Lights in the cab and on the train are supplied at 24 V d.c. from transformer rectifier units from diesel-driven alternators installed for air conditioning, train fluorescent lighting and other auxiliary services. This system is described later in the article. A 110 V driver's cooker with three-heat switch is provided in each cab.

The Pullman trains are the first diesel units on BR to have fully springborne traction motors. A Brown Boveri spring drive is used to provide for relative movement between motor pinion and car wheel centres. Traction motors are four pole self-ventilating machines with a rating of 425 A, 383 V, 199 h.p. at 1,360 r.p.m. Gear ratio is 19/67. The two motors in each power bogie are connected in parallel, those in the second coach being supplied through eight cables from the power car.

Control

The method of control provided consists essentially of selecting eight different engine speeds between idling and 1,500 r.p.m. At each speed, corresponding output is available over a wide range of train speeds, determined by the action of a governor-controlled generator field regulator, supplemented in some conditions by one step of traction motor field diversion. Engine speed control is effected by the action on the governor of three solenoids, which lift in different combinations as determined by master controller contacts. This provides exactly synchronised control of the power units at both ends of the train. A 36-line control cable runs throughout the train. This is conveyed between coaches by jumpers and receptacles having butt contacts. This form avoids difficulties experienced with plug and socket types when plugs become misaligned.

Two-stage electro-pneumatic brakes by Westinghouse are fitted throughout the trains. There is electrical control of solenoids in every coach, connected by the train wires, with resultant simultaneous operation of the brakes

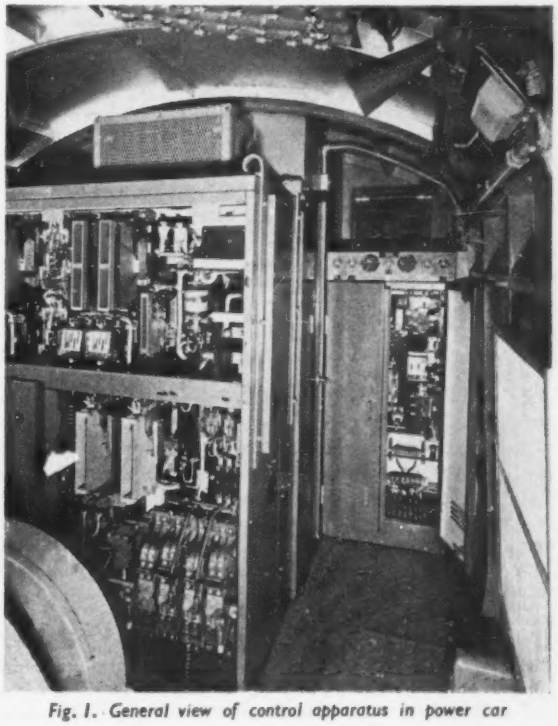


Fig. 1. General view of control apparatus in power car

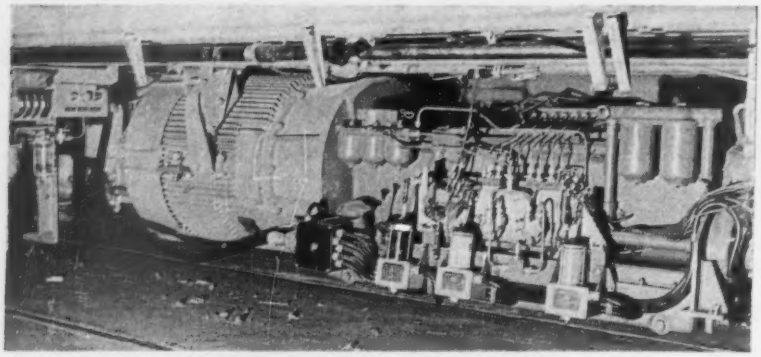


Fig. 2. Engine-generator set slung under car

throughout the train. When braking from high speeds, additional force is automatically exerted.

It has already been mentioned that the Pullman cars are provided with air conditioning. Power for this system, which has been supplied by J. Stone and Co., comes from an engine-driven alternator mounted under the cars next to the motive power cars. Each of these power units (Fig. 2) consists of a Rolls-Royce horizontal eight-cylinder normally aspirated oil engine rated at 190 h.p. at 1,500 r.p.m. coupled to a Stone's "Tonum" alternator with overhung exciter, having an output of 133 kVA, 400 V, 3-phase, 50 c/s. The engine-alternator unit is mounted under the car, the shafts being parallel to the direction of travel and the engine accessible for servicing from both sides of the track. The alternator is a four-pole machine of the rotating field type, having salient poles with pole-face windings for improved stability of operation. Totally enclosed construction is used with cooling by an external cowled fan. Electrical control equipment associated with the set is also mounted under the auxiliary car.

The air conditioning system includes air cooling and dehumidification facilities involving a mechanical refrigeration system with Freon 12 or Arcton 12 as a refrigerant. The compressor and condenser units of the system are mounted on the underframe of the car, the evaporator unit being above the car ceiling. There are electrical heating elements mounted in the air conditioning unit and at floor level for heating the cars. Air is circulated by centrifugal fans in the air conditioning unit and operation of the air conditioning is entirely automatic. Three operating conditions are available, selected by switch. There are arrangements for time delay between starting the air conditioning and motor compressors on each car, so that excessive load is not imposed when air conditioning in all cars is brought into operation. Motor compressor and condenser fan motors are protected by miniature circuit-breakers.

ELECTRO-MEDICAL SAFETY

MORE attention to electrical safety by hospitals operating electro-medical equipment is called for in a circular (HM(60)49) which has been issued by the Ministry of Health. It arises from an accident that occurred recently in which a patient received a fatal electric shock while connected to the sensing electrode of a combined cardiac monitor/defibrillator. A major defect in the equipment on this occasion was inadequate separation between the parts of the apparatus having electrical connections to the patient and those connected to mains electricity.

The Ministry of Health thinks there is general evidence that its suggestions for regular and periodic testing and inspection of electrical apparatus are not being followed. It lists in the circular certain minimum electrical safeguards, noted below, and says that as an alternative to inspection by an experienced electrical engineer before equipment is put into service, the supplier or manufacturer should be asked to state in writing that the equipment complies with these safeguards.

Examples of the apparatus which ought to be inspected where they are operated by mains electricity are: cardiographs, encephalographs, myographs, defibrillators, cardiac pacemakers, diathermy apparatus, transformers for surgical lamps and cautery, electro convulsive and narcosis apparatus, galvanic and faradic apparatus and nerve stimulators.

The following are the suggested minimum electrical safeguards:

(1) Circuits having conductors which are used in contact with patients should be completely isolated from mains electricity by a transformer complying with paragraph 27 of the Safety Code in the Ministry's report on anaesthetic explosions.

(2) Conductors of patient electrode circuits and other circuits which are liable to come in contact with patients should be separated sufficiently from conductors which operate at mains potential and from other high voltage conductors, and be so secured and insulated that accidental contact between the circuits is precluded, e.g., in the event of a conductor fracturing or becoming displaced. The use of thin single conductor wiring for internal connections is unsatisfactory.

Clearances

(3) There should be adequate space between conductors operating at mains or similar potential and other condutors or non-current-carrying metal parts. There are many considerations affecting the necessary minimum space. As a general guide (excepting conductors insulated to conform with the relevant British Standards and components made to British Standards) it is suggested that not less than $\frac{1}{4}$ in. for 250 V should be the air-space or distance over an insulating surface (tracking distance), separating conductors, terminals, etc., from each other or from other metal parts.

(4) All metal parts liable to become "live" in the event of an insulation failure or fracture occurring should be bonded together and connected to a main earth terminal and to the earth conductor of the supply flexible cable. It is, of course, essential that earthing terminals make good electrical contact with the casing. Separate earth bonding conductors should not be less than 7/·029 in. copper or equivalent.

NOTES ON WIRING

BY MEGOHM

IT doesn't seem to matter where I go, whether on business or pleasure, the ring circuit always crops up in the conversation and fresh ideas on the matter are brought to my notice. Whilst in Surrey recently I was discussing houses in general and heard that the local electricity board were perfectly happy with rather an odd method (to me anyhow) of installing a ring circuit. The wiring for this particular ring was installed on the *outside* of the house and consisted of a ring of m.i.c.c. cable (equivalent to 7/036) with a series of spurs taken from connection positions on the ring into the socket-outlets *inside* the house. The connection points were machine-faced adaptable boxes with heavy duty type connector blocks fitted inside. There is nothing wrong with this arrangement as far as I can see from the engineering aspect, although feeding all sockets from spurs where there are more than six of course offends the regulations. In some areas the local board would object to it. I understand that the client was extremely pleased with the arrangement for there was very little disturbance inside the house. Of course the client had to "come and go" with the placing of the outlets, but all was well in the end.

This arrangement could, of course, be an economical one even if installed within the house itself and would give a better chance of installing that extra outlet after occupation. There are obstacles but I feel it worthwhile to experiment with the idea. Further thought on the matter automatically leads to the opinions already expressed in the ELECTRICAL TIMES—why not lighting on a ring, too?

Other Services

Going on from the matter of ring circuits, I was interested to hear from the same contractor that when he is called upon to carry out an installation in a new house he puts in a conduit from the outside to a selected position to house the telephone cable. His efforts are not always appreciated for in one or two cases the telephone engineer has gaily ignored the conduit and tacked his cable around the house. This sort of thing must be heart-breaking to a person who takes the trouble to try and conceal all cables. Why is it that telephone engineers are so unco-operative? I have other matters which, to me, seem in order yet are frowned on by the GPO. They always appear to need twice as much room in conduits, trunking and outlet boxes as anyone else.

Another refinement which this contractor adds to the installation is a conduit leading from the roof space to the TV position, complete with necessary coaxial cable. I found it very heartening indeed to hear of such care and thought going into an installation.

Drilling Joists

My comments on the drilling of joists for sheathed cable systems have resulted in a few remarks being passed. One reader, who apparently writes about power aids for the electrical contractor, points out that he has seen such tools which are necessary to drill straight holes through joists and I cannot do better than quote him. "For carcase work in timbered floors, round shank bits for fitting into the electric drill are attractive. A hole for p.v.c. sheathed cables can be drilled in 20 seconds and since the *assembly can lay between joists* it has the advantage of making straight holes without any dip." This suggests to me that the drill used is an ordinary electric drill and not the type described to me as being in use in the aircraft industry, yet it seems to do the job required. Or is there something else behind the fact that few contractors use such equipment? Contracting work has always appeared to me to be very hard on tools and plant. This may be partly due to misuse by operatives or even to site conditions where it is always difficult to keep equipment clean and in good repair. The cost of plant on the larger jobs must be fantastic.

I feel that although one reader has produced an answer to the problem, many contractors have other views on the matter and I would like to hear them.

PSALI

A strange word, "PSALI," was first seen by me in a Building Research Station Digest and stands for the Permanent Supplementary Artificial Lighting of Interiors. Obviously the digest is too lengthy for me to summarise in any detail in these notes. However, I can say that PSALI is a new idea for the lighting of relatively large interiors, and its implications have not yet been fully worked out. It appears that in the days when artificial lighting was expensive, the cost of a window was not questioned but today the situation is quite different. Those concerned with PSALI state that although there is nothing inherently wrong with artificial light, there is evidence that people do prefer to be in "visible contact" with natural daylight for their well-being. I myself feel this way and would like to see more daylight let into buildings. PSALI, of course, combines the two and the artificial lighting is worked into the design of the building.

What does the idea involve for our side of the business? I mean the installation side. Obviously the idea means more careful planning by consulting engineers and lighting experts, involving, in my opinion, a selection of lighting fittings *before* the job goes to tender. This is something which is not always done at present. The lighting points are usually indicated and are assumed as being capable of serving a certain range of fittings. With this new idea, if it is adopted, we shall see greater use being made of translucent panels and, therefore, the wiring must be carried out in such a way that it is not seen when the panels are lit. I've seen instances of lighting concealed behind panel which has shown the "works" to all and sundry.

I feel that our lighting is really on the move towards something really up-to-date but I also feel that this trend calls for much closer co-operation between architects and consultants—that is if the former doesn't think he knows it all himself!

OVERSEAS NEWS

from our correspondents abroad

CANADA

Wood Fuel

A new $1½ million, 5,000 kW power plant, fuelled by wood waste, is now providing all power supplies for the Eburne Saw Mill and Hunting-Merritt Shingle Divisions of Canadian Forest Products Ltd. Eburne last year had the biggest lumber cut of any mill in the Commonwealth—140 million board feet. With fuel that costs "less than nothing," the new plant marks another step in the continuing programme of forest utilisation in BC. It replaces two obsolete power plants (one unused for several years) and 11 steam boilers which powered various machines in the mill. In recent years the company has also taken a bulk supply from the British Columbia Electric costing around $280,000 a year. In the new plant, after operating the generators, steam is taken off at low pressure to operate the shingle and lumber dry kilns, sawmill carriage drives and steam cylinders used in handling logs and lumber. Fuel for the plant is two-thirds shingle mill waste (formerly burned) and one-third hemlock sawdust and bark from one sawmill. Waste from two other sawmills at the same location is shipped on barges to other companies' pulp mills for boiler fuel. Canadian Forest Products, a private company and the only large fully BC-owned firm in the forest industry, has achieved an advanced degree of integration—although it is not the first to generate its own power.

Appliance Fall-off

Trade in electrical appliances in Canada in the first five months of 1960 dropped by about 20%, it was stated at the marketing seminar of the Canadian Electrical Manufacturers' Association in Toronto earlier this month. Sales of major appliances through department stores were down by some 4% in the first three months and over 13% down in April it was stated. One appliance dealer maintained that the reason for the decline was "lack of control by manufacturers in the marketing process." He is Mr R. Keelan, an official of two leading electrical retail associations. He stated that whereas retailers were being urged to operate modern stores, provide parking and offer services, other dealers who provided no such facilities were being subsidised by the manufacturers with better prices and more generous advertising allowances. In his view, national brand manufacturers and their retail outlets had failed to keep pace with makers of private brands and their outlets—the department stores. He appealed to manufacturers to decide whether they were going to market through supermarkets, discount houses and their own controlled stores, or through independent retailers. Although he saw little hope of an immediate change in marketing policies, he felt that eventually, in the non-metropolitan market, distribution would be through one-line dealers who would control the product in that area in co-operation with the manufacturer. In the metropolitan market there was more likely to be centralised marketing, perhaps one central retail headquarters to handle warehousing, delivery, sales training, credit service and promotion. Retail outlets would be manufacturer-controlled though not necessarily owned. There would also be uniformity of name and store design, he believed.

U.S.A.

Appliance Sales

American manufacturers of major domestic electric appliances are also facing severe contraction of the market there. The General Electric is the latest concern to lay off several thousand workers in its Louisville plant, where refrigerators are the main product, but it is understood that several other prominent manufacturers are similarly placed with heavy stocks of finished goods and lack of orders. Retail sales have been dropping in recent months despite intense price competition at wholesale and retail levels.

NICARAGUA

Bank Loan

To help finance construction of the Rio Tuma hydro-electric project, the World Bank has approved a loan to Nicaragua equivalent to $12½ million. The project will more than double the capacity of the power network serving Managua and the main towns of Nicaragua. The loan is being made to the Empresa Nacional de Luz y Fuerza, an autonomous entity of the Government. Empresa owns and operates the only transmission system in Nicaragua and serves nearly 70 per cent of the urban population. The company itself distributes power retail in Managua and sells it wholesale to municipal and private power companies for distribution in other towns. Total cost of the Rio Tuma power project is estimated at the equivalent of $20,800,000. The Bank loan will cover most of the foreign exchange requirements; the remaining cost will be met partly by Empresa from retained earnings and partly by the Government from its own funds and from a loan equivalent to $2,500,000 recently authorised by the United States Development Loan Fund. The Tuma project, as we reported on 1 Oct., 1959, envisages harnessing the Rivers Tuma, Viejo and Grande de Matagalpa. Five power stations with a total installed capacity of 130 MW are to be built. Under the scheme, the River Tuma is to be diverted from the Atlantic towards the River Cacaco, a tributary of the River Viejo that flows into Lake Managua.

BRAZIL

Bank Loan

Brazil's Banco Nacional do Desenvolvimento Econômico has guaranteed a 1,000 million lire loan to cover imports of equipment and material for the transmission lines and substations of the Candiota electricity supply system in the State of Rio Grande do Sul. The bank has at the same time guaranteed 20 million Danish kroner for the purchase of 37 diesel generators to be installed in Rio Grande do Sul.

EUROPE

International Grid

Plans for the erection of a high voltage transmission line to run from Romania to Czechoslovakia via Russia have now been approved. Poland is also to be brought into the link-up by the erection of a central power junction at Mukaczew.

UGANDA

Electrification Programme

A survey just completed by the Uganda Electricity Board shows that the majority of coffee curing and hulling factories within the board's area of supply are now fully electrified. Twenty-two coffee processing factories took power from the public supply for the first time during the 1958-59 season—double the number connected in the previous season. Over three-quarters of

Uganda's total coffee crop is now processed at electrified factories. Consumption of electricity by the industry rose to 2,921,000 units, an increase of one-third over the 1957-58 figure. Progress has also been made in bringing electricity supplies to more cotton ginneries. Forty-four ginneries used a supply from the board to process the 1958-59 crop—13 more than in 1957-58. Twenty of these ginneries also utilised electricity for other purposes, such as maize and oil-seed milling. By the end of 1959 there were 51 ginneries fully electrified and a further 15 taking a supply of electricity for lighting purposes only. The main problem encountered in the board's electrification programme for the cotton processing industry has been the reluctance of ginners to incur the heavy capital cost involved in making the changeover from their existing prime-movers to electrically-powered machinery. As capital equipment becomes due for replacement, however, the expansion of the industry's use of electricity, which has more than doubled in the last four years, is expected to continue.

INDIA

Punjab Plans

Establishment of power plants at Dahar and Pong under the Beas Project, nationalisation of 13 private electric supply undertakings, electrification of about 3,000 more villages and a power project for the Lahaul and Spiti areas are some of the important schemes included by the Punjab State Electricity Board in its third Plan proposals. The board's Plan has been divided into three main parts—multipurpose power projects (Rs 48·90 crores), power expansion programme (Rs 31·47 crores) and the Lahaul and Spiti power project (Rs 29·82 lakhs). In 1947, at the time of partition, only 50 towns and villages on the Indian side of Punjab were getting electricity. The number of general and industrial consumers in the State then was 18,131 and 1,443 (including 19 bulk and about 50 tube-well consumers), respectively, with a total connected load of 30,366 kW. It is now claimed that all the towns in the State with a population of over 10,000 have been electrified and the number of villages electrified by the end of the current Plan will rise to 3,078. It is proposed to provide power to about 2,910 more villages during the third Plan. The scheme is estimated to cost Rs 1,339·15 lakhs, of which Rs 309·90 lakhs is proposed to be spent to electrify 793 villages under the Uhl River scheme. At present the transformers at the 132 kV grid substations at Kangra, Pathankot, Dhariwal, Verka and Butari under the Uhl River scheme are overloaded. It is proposed to augment the system at a cost of Rs 19·23 lakhs. Another Rs 68·82 lakhs has been allocated for the construction of new 33 kV lines and substations. The private supply undertakings to be taken over during the third Plan are: Hissar (1962-63), Hansi (1962-63), Bhiwani (1962-63), Ambala City (1962-63), Loharu (1962-63), Bhatinda (1963-64), Rohtak (1964-65), Ambala Cantonment (1965-66), Sirsa (1965-66), Rewari (1965-66), Jagadhri (1965-66) and Kasauli (1965-66).

Factory Start-up

Every effort is being made by Heavy Electricals Ltd. to adhere to its target date of 1 July, 1960, for the start-up of production. Mr K. B. Mathur, chairman of the concern, recently stated that despite the vicissitudes which had beset the project he was confident the target date would be met. Initially the Bhopal project will manufacture switchgear control panels, power transformers and capacitors of small sizes, and will progressively cover wider ranges as the workers and technicians gain experience and proficiency.

Motor Tariff

The Government of India have prescribed tariff values for electric motors. These values range from Rs 110 (£8 5s) to Rs 400 (£30) for motors of the single or split-phase type and Rs 300 (£22 10s) to Rs 2,000 (£150) for three-phase squirrel-cage motors, depending upon the horsepower and synchronous speed of such motors. All slip-ring motors, special motors and three-phase squirrel-cage motors exceeding 20 h.p. rating will continue to be assessed on the basis of value determination by the Central Excise Officer in accordance with Section 4 of the Central Excises and Salt Act.

PAKISTAN

Another Cable Firm

A new cable company, with British, Canadian and Pakistani interests, is being formed for the purpose of establishing an aluminium cable plant in Pakistan. The new concern, which has the title Alcan Cables of Pakistan Ltd., is sponsored by Aluminium Ltd. of Canada, British Insulated Callender's Cables Ltd., and Pakistan Cables Ltd. (The latter concern was formed in April, 1953, by BICC, Telcon and J. and P.) It will have an authorised capital of Rs 10 million in which the Pakistan public is to be invited to participate. The aim is to cater for Pakistan's entire requirements of all aluminium and aluminium steel reinforced conductors. Manufacturing technique and advice will be provided by Aluminium Ltd. through their associates, Aluminium Laboratories Ltd. The new company, although an entirely separate entity, will be located within the compound of Pakistan Cables Ltd. at Sind Industrial Trading Estates, Karachi. Subject to formal approval by the Government, it is planned to commence production early next year. The new company will also produce aluminium conductor accessories and, ultimately, fine wire conductors.

THAILAND

Small Plants

Proceeding with plans for widespread electrification, the Thailand Government propose to establish a series of 225 small power stations in 30 northern and central provinces. The aim is to begin erecting these in 1962, we understand.

JAPAN

Largest Station?

The Kansai Electric Power Co. recently held a ceremony to mark the completion of its Osaka steam power station constructed at the mouth of the Kizu River. The power station, equipped with four generators aggregating 624,000 kW, is said to be the largest steam plant in the Orient. With a capacity enough to meet the entire needs of Osaka, the power station's output will probably be shared with the Hokuriku district.

A further contract, valued at £1,200,000, for the supply and installation of overhead equipment for 25 kV 50 cycles a.c. railway electrification has been awarded to the BICC Group by the Indian Railway Board. The job covers some 300 track miles of the Eastern Railways system. The route to be equipped is on the main line from Delhi to Calcutta and lies between Gaya and Moghalsarai. It forms part of the second phase of the Indian Railway Board's electrification programme and is to be ready for use by July, 1961. The equipment will be similar to that at present being installed by the BICC Group for the South Eastern Railway, the order for which was announced in December, 1958. Such rapid progress was made on that scheme that it was possible for a section of the line to be energised only 12 months later so that an electric locomotive could make a demonstration run for delegates attending a meeting of the International Railway Congress Association. Our picture alongside is of the o.h. equipment in the Kendposi Station area, on that line

Personalities *in the industry*

The Caroline Haslett Memorial Trust (General Section) has awarded travelling exhibitions to two British women engineers to enable them to study the training, employment and prospects of women engineers in the USSR. They are **Miss Lesley S. Souter,** B.SC., A.R.T.C., A.M.I.E.E., leader of the Magnetic Materials Section of the AEI Research Laboratory at Harlow, and **Miss Rosina Winslade,** M.S.I.T., senior sales engineer with Research and Control Instruments Ltd. It is hoped that arrangements can be made for Miss Souter and Miss Winslade to go to Moscow in the autumn and to visit schools, technical colleges and research institutes, as well as factories engaged in light and heavy engineering. On their return they will present a report and give lectures on their findings. These are the first awards to be made by the General Section of the Caroline Haslett Trust.

Mr R. H. S. Turner, M.A., M.I.PROD.E., director and works manager of Associated Electrical Industries (Manchester), has been elected chairman of the Council of the Institution of Production Engineers.

Formerly medical adviser to Imperial Chemical Industries Ltd., **Dr A. J. Amor,** C.B.E., M.D., M.SC., has been appointed medical adviser to the London Electricity Board.

Mr D. R. Stanley-Adams has been appointed export sales manager of the International Division of US Industries Inc. (Gt. Britain) Ltd. He will cover Europe and the Middle East for this organisation, which acquired the Burtonwood Engineering Co. last October.

Lord Dudley Gordon is to retire from the office of chairman and director of J. and E. Hall Ltd. as well as president of Hall-Thermotank Ltd., on 30 Sept.

Tomorrow, 1 July, marks an important stage in the life of **Mr C. C. Bleach,** WH.EX., M.I.MECH.E., M.I.E.E. He takes up office as the new president of the South Wales Institute of Engineers, and also retires from the position of managing director of Concordia Electric Safety Lamp Co., of Elcordia Ltd., the London Platinum Screw Manufacturing Co. Ltd., Pilkington's Plating (Cardiff) Ltd., and Parking Meters (Europe) Ltd. At the same time he also relinquishes his directorship of the Rimer Manufacturing Co. Ltd. and Sargrove Electronics Ltd. Mr Bleach was an apprentice electrical fitter in H.M. Dockyard, Portsmouth, from 1911 to 1917, and was subsequently a draughtsman in the Electrical Department there for two years. He joined Johnson and Phillips Ltd., in Cardiff and Swansea, as assistant engineer in 1919, and three years later took up a post with Wm. Angus Scott and Partners, consulting engineers. In 1924 he became chief electrical engineer to the Doncaster Colliery Association, a post he held for 11 years and, after a year as a commercial engineer (mining section) to the Yorkshire Electric Power Co., he joined the Concordia Electric Safety Lamp Co. in 1936 as general manager, being promoted to managing director in place of the late Theodore Stretton later that year.

Electricity service manager at Chatteris, Cambs, since 1936 and a member of Chatteris U.D.C., **Mr P. F. Hayes** has been appointed assistant manager of the new Isle of Ely branch of the Eastern Electricity Board. Mr Hayes started his career about 30 years ago with the former Beds, Cambs and Hunts Electricity Co.

At a recent meeting of the Council of the British Welding Research Association, **Mr J. D. D. Morgan** and **Dr L. M. Wyatt** were appointed to the Research Board. Mr Morgan is with the General Chemical Division of Imperial Chemical Industries Ltd., and is the chairman of the ICI Welding Panel. Dr Wyatt is the chief metallurgist of the Central Electricity Generating Board.

Sir John Carmichael, who was chairman of the Sudan Light and Power Co. from 1952 to 1954, has been appointed deputy chairman of the Independent Television Authority until 29 July, 1964. Sir John has been a member of the authority since January, 1960, and fills the vacancy caused by the death of Sir Ronald Matthews last July.

Mr H. G. Nelson, managing director of the English Electric Co. Ltd., has been elected vice-president of the Council of the Society of British Aircraft Constructors.

A new research centre for Hawker Siddeley Industries Ltd. is to be established at Stockport. It will provide basic research and development facilities for both Mirrlees, Bickerton and Day Ltd. and the National Gas and Oil Engine Co. The centre will be directed by **Dr J. A. Pope,** PH.D., D.SC., WH.SC., M.I.MECH.E., who joins the boards of both the Mirrlees and National companies. Dr Pope was apprenticed with Boulton and Paul Ltd. and received his early technical education at the Norwich Technical College. He won a Whitworth Scholarship in 1935 and attended King's College, London, where he obtained a First Class Honours Degree in Mechanical Engineering. He obtained his Ph.D. at Queen's University, Belfast, in 1943 and his D.Sc. from the same University in 1948. He was appointed Professor of Civil and Mechanical Engineering at the University of Nottingham in 1949. Dr Pope is the author of 27 technical papers and the editor and co-author of a collective work on metal fatigue which was published in 1959. His research interests have been mainly concerned with the deformation of metals due to dynamic loading, the fatigue of metals, temperature stresses, the failure of diesel engine components, and heat transfer in turbine blading. During the past four years he has been responsible for the planning of the new laboratories for the Faculty of Applied Science at the University of Nottingham.

Mr G. E. More has joined the south east region of Philips Electrical Ltd. as lamp and lighting representative for Kent. He takes over from **Mr J. P. Skehens,** who has been transferred to the Regional Street Lighting Department.

Formerly technical representative on industrial heating with the General Electric Co. Ltd., **Mr P. Conley** has joined E. K. Cole Ltd. as technical sales representative, Yorkshire and north east coast area, on Ekco heating.

Worthington-Simpson Ltd. announce the appointment of **Mr K. P. H. Jeens,** ASSOC.I.MECH.E., F.INST.PET., as manager, Oil Industries Department, at their London office. Mr Jeens was until recently with Stone and Webster En-

At a CIGRE social function in Paris. Right to left: Mr G. F. Peirson, deputy chairman, Midlands Electricity Board; Mr C. R. King, K.B.E., *chairman, Electricity Council; Mr W. A. Gallon, chairman, S Wales EB; and Mr S. H. Reece, manager, Cobra (Wood Treatment) Ltd.*

Mr J. Chapman

Mr E. C. Rippon

Mr R. Bruce

Mr R. J. Roy

Mr T. W. Hills

gineering Ltd. where, for the last six out of 14 years, he was pump and compressor engineer.

After 32 years with the company, **Mr J. Wiseley** has today retired from Crompton Parkinson (Chelmsford) Ltd. He joined the firm at Guiseley as chief accountant and registrar. He moved to the Chelmsford works in July, 1940, as commercial manager and has been responsible for financial and office administration there as well as the co-ordination of the works services.

Mr J. Chapman has been appointed administrative assistant of the Electrical Development Association, in succession to **Mr W. C. Spooner,** whose retirement we reported last week. Mr Chapman, who is 41 years of age, was with ELMA from 1948 as an accountant until its dissolution in 1957, when he took up a similar post with the Electronic Engineering Association.

Mr H. G. Campbell, managing director of the Benjamin Electric Ltd., leaves London by air on 1 July on a business visit to New Zealand, Australia and Canada, returning to London on 27 July.

Mr A. V. Edwards, managing director of Ultra Electric (Holdings) Ltd., flew to the USA earlier this week on a business visit to New York and Chicago.

Currently spending three weeks at the Wolverhampton works of John Thompson Ltd. are four boiler inspectors from India, Pakistan and the Sudan. They are **Mr P. M. Rao,** inspector of boilers, Government of Andhra Pradesh; **Mr C. M. Prasad,** senior inspector of factories, Mysore Region; **Mr A. S. Khan,** inspector of boilers, Government of West Pakistan; and **Mr A. I. Yousif,** boiler inspector for the Sudan. Another visitor at the works is **Mr M. Mobin** from Pakistan, who has come to Britain under the Colombo Plan.

Mr C. C. Smith, M.I.E.E., F.I.E.S., city lighting engineer of Liverpool, has been invited to become a member of the Street Lighting sub-committee of the Road Research Board.

From C. A. Parsons and Co. Ltd. we learn that **Mr. E. C. Rippon,** M.I.E.E., formerly chief transformer engineer, has been appointed to assist the managing director in matters relating to the organisation of design and production throughout the works. Mr Rippon has also been appointed as consultant to the Transformer Division of the Company. His successor as chief transformer engineer to the company is **Mr Robert Bruce,** M.SC., M.I.E.E., who has held the position of deputy chief transformer engineer for a number of years.

Mr R. J. Roy, D.F.H., A.M.I.E.E., has been appointed sales manager of Lee Guinness Ltd. He received his early training at Faraday House and after a period in the works joined ASEA Electric Ltd. During the last war he served as an Electrical Lieutenant in the RNVR. After returning to ASEA in 1946 he was subsequently appointed by George Ellison Ltd. to their London office. Mr Roy will be based at 25 Victoria St, now Lee Guinness's main sales office.

The new west London depot of British Insulated Callender's Cables Ltd. being opened at Silverdale Rd, Hayes, Middx, on 4 July, will be under the charge of **Mr T. W. Hills,** who was formerly a sales representative with the London branch. Apart from war service with the RAF he has been on the BICC sales staff since 1930.

OBITUARY

Mr William Cross, principal director of Falconer, Cross and Co., electrical contractors of Newcastle upon Tyne, has died, aged 86. He was president of the Electrical Contractors' Association in 1915-16.

Mr G. Hunter, service centre supervisor at Lincoln district of the East Midlands Electricity Board, died on 21 June, aged 64.

I.E.E. Awards

THE Council of the Institution of Electrical Engineers have made the following award of Premiums for papers read or accepted for publication during the Year 1959:

Group A.—*Kelvin Premium (value £25)* to **E. P. Butt,** B.SC., **R. Carruthers,** B.SC.(ENG.), **J. T. D. Mitchell,** B.SC.(ENG.), **R. S. Pease, P. C. Thonemann, M. A. Bird,** B.SC., **J. Blears,** B.SC.(ENG.), and **E. R. Hartill,** B.SC.(ENG.). *John Hopkinson Premium (value £25)* to **D. A. Barron,** M.SC.

Group B. Electronics and Communications Section Premiums.—*Duddell Premium (value £20)* to **G. B. B. Chaplin,** M.SC., PH.D., **A. R. Owens,** M.SC., and **A. J. Cole,** B.SC. *Ambrose Fleming Premium (value £15) to* **A. E. Karbowiak,** PH.D., B.SC.(ENG.), and **V. H. Knight.** *Premiums (value £10 each)* to **A. H. W. Beck,** M.A., B.SC.(ENG.), **Prof A. L. Cullen,** PH.D., B.SC.(ENG.), **L. Lewin, G. Craven, V. H. Knight, R. Beaufoy** and **H. A. C. Hogg,** B.SC.

Measurement and Control Section Premiums.—*Silvanus Thompson Premium (value £20)* to **L. Essen,** O.B.E., D.SC., PH.D., F.R.S., **E. G. Hope,** B.SC., **J. V. L. Parry,** M.SC., *and* **J. McA. Steele,** B.SC.(ENG.). *Mather Premium (value £15)* to **W. K. Taylor,** B.SC., M.SC., PH.D. *Premiums (value £10 each)* to **A. M. Thompson,** B.SC., and **O. P. D. Cutteridge,** M.SC.(ENG.), PH.D.

Supply Section Premiums.—*Sebastian de Ferranti Premium (value £20)* to **T. H. Mason, P. D. Aylett,** PH.D., M.SC.(ENG.), and **F. H. Birch,** B.SC.(ENG.). *John Snell Premium (value £15)* to **J. S. Forrest,** M.A., D.SC., **P. J. Lambeth,** B.SC.(ENG.), and **D. F. Oakeshott,** B.SC. *Premiums (value £10 each)* to **F. S. Fay,** M.A., **J. A. Thomas,** B.SC., **D. Legg,** B.SC., **J. S. Morton,** B.SC., **T. R. Manley,** B.SC., **K. Rothwell** and **W. Gray.**

Utilisation Section Premiums.—*Crompton Premium (value £20)* to **M. C. Crowley-Milling,** M.A. *Swan Premium (value £15) to* **D. B. Corbyn,** B.SC.(ENG.), and **N. L. Potter,** B.SC.(ENG.). *Premium (value £10)* to **E. Jacks.**

Non-Section Premiums.—*Llewellyn B. Atkinson Premium (value £15)* to **C. J. Carpenter,** M.SC.(ENG.).

Group C. *Heaviside Premium (value £15)* to **P. R. Bryant,** M.A., M.SC. *Oversea Premium for Senior Members (value £15)* to **S. Y. King,** B.SC.(ENG.), PH.D.

Graduate and Student Premiums.—*Premiums (value £10 each)* to **R. Hawley,** B.SC. and **P. Powers,** B.SC. *Premiums (value £5 each)* to **B. G. Cryer, K. Gunary, G. L. Horrobin, A. D. Hawkins, J. M. Walker and M. H. Walshaw,** B.SC.(ENG.).

Automatic gauge control for strip

A NEW device, the third of such automatic devices produced by the English Electric Co. for the steel industry in the last 18 months, now enables cold rolled metal strip to be produced automatically within close tolerances free from the constant supervision of the machine operator. A flying micrometer, mounted on the edge of the strip, continuously monitors the gauge and transmits a signal which automatically operates the roll screw-downs to adjust the thickness whenever it wanders from the selected value by more than two-thirds of a preset tolerance. The required tolerance is selected by a multi-position switch on the control panel, typical values being ¼, ½, 1 and 1½ thousandths of an inch.

On reversing mills, three micrometers are used, one each side of the rolls and one as spare, each coupled to a computing amplifier. At slow rolling speeds, an electronic time delay is applied to the signal to ensure that, after one correcting signal has been passed to the controller, no further signal is received until the screw-downs have operated and the corrected gauge has passed the micrometer, thereby preventing "hunting." At high speeds the automatic monitoring is continuous. Incorrect settings, failure to apply the micrometer to the strip, breaks in the strip and the passage of the "thick end" of the strip through the rolls all would cause an excess error which automatically disconnects the control and warns the operator that the machine is "in manual."

The equipment is contained in a 2 ft by 2 ft by 7 ft 7 in. dustproof steel cabinet and three mills, one of which is at ICI Metals Birmingham, have now been equipped with the device. Not only does it give greater accuracy in strip thickness but, by freeing the operator for other duties such as coil changing, it also steps up production per mill.

Electric overblanket factory opened

WITHIN the last few days the first deliveries of the British-made "Monogram" electric overblanket, described on page 821 of our 19 May issue, have been leaving the new factory at Crawley, where production is now well under way. This enterprise, a wholly owned subsidiary of the International General Electric Company of America—and which had adopted the name "Monogram" to avoid confusion with British GEC—represents the first step in producing here electrical products designed and manufactured in other factories operated by the parent company throughout the world. Last week members of the electrical Press were invited to see over the new plant by Mr G. C. Crowley, managing director, where rolls of blanket cloth in three colours with in-woven pockets between the two layers were being rapidly converted to overblankets on a production line which, at full capacity, will eventually turn out some 4,000 overblankets a month. The cloth is, incidentally, being specially woven by the Dormy mills and, though for the present the special element wire and control equipment components are being imported from the USA, these, too, will be made here as well in due course.

Blanket wire, on long aluminium shuttles, being inserted into the woven-in channels of the blanket material

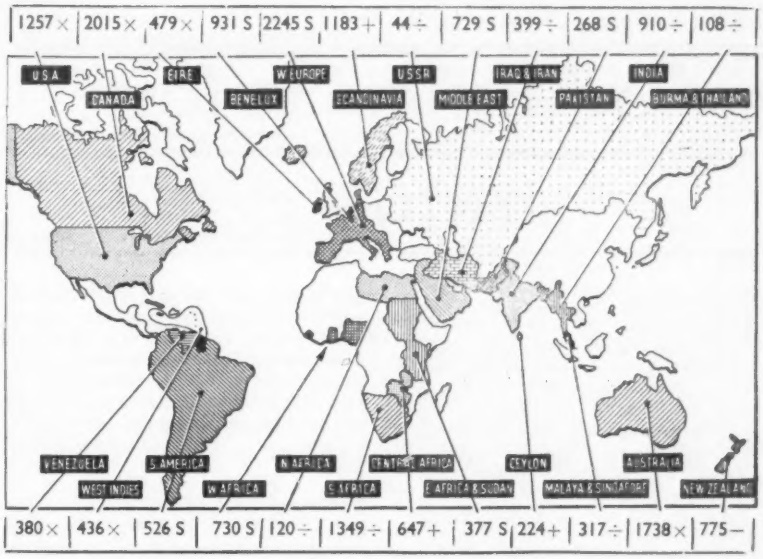
The casing of the control unit, which enables the user to select the blanket temperature to suit his needs after which it is automatically adjusted by variations of ambient temperature, is moulded at the factory as are also the special interconnection plugs and sockets. On the dual blankets each person in a twin bed has the option of selecting his or her own adjustment independent of the other and, of course, the blanket incorporates the unique system of overtemperature control described in our previous issue. To demonstrate this, Mr R. G. Holmes, manager of engineering, showed how the heat from a glowing cigarette end applied to the wire immediately isolated the blanket and afterwards, in the laboratory, demonstrated the safety still further by washing a blanket with the current on in a washing machine.

Distribution

Mr B. A. Schweizer, manager of marketing, said that, for the present, distribution would be through wholesalers, electricity boards and multiple stores in London and south eastern counties and expansion into other areas would follow as production increased. Plans were also being made for export into the European markets from the factory which, as the visitors had seen, was being equipped for large-scale production. The blanket was the safest of the bed-warming devices and had now been tested in service since 1947 in the USA, where it commanded nearly 20% of the electric blanket market. Asked how it would meet the British Standard (BS 2612) which required an instruction to the effect that the user must not go to sleep with the blanket switched on, Mr Schweizer replied that a revision of the standard was being sought on the grounds that the "Monogram" blanket had been specifically designed for operation while the user was sleeping. The tests which had been shown in the laboratories were, he thought, convincing proof of the very high standard of safety with this device.

Distribution of Exports in £'000's Sterling

×=over 25% increase
+=10% to 25% increase
S=10%+ to 10%−
−=10% to 25% decrease
÷=over 25% decrease
on previous year's figures.



EXPORTS IMPORTS

May

EXPORTS of electrical goods during the month of May at £23,022,553, as listed in our table alongside, were over £1 million in value down on the figure for April, but above the monthly average for the year so far. In many respects the figures may be considered disappointing. The heavy-plant class, for instance, was over £1¼ million down on a year earlier, despite the high figure of £1,480,000 for generator parts.

Domestic appliance exports again rose nearly £500,000 higher than in April and £400,000 up on a year ago, with refrigerators and vacuum cleaners maintaining a high rate. In the fans exported, the ceiling type alone amounted to £72,599 in value—well down compared with a year ago—while the desk type increased to £31,612. The continued high value of imports of electrical equipment will also be noted, the April figure was £4,560,513 and for March £5,554,218, with refrigerators again dominating the items.

Broken down into the individual countries, Canada was our best customer for the month, its total of £2,015,159 including £1,244,314 for generators and motors, £88,139 for cables and £159,860 for radio and electronic gear. Australia took the next highest total value, £1,738,452, followed by South Africa at £1,349,001 (nearly £1 million down on a year ago) and the USA at £1,257,025. The latter figure included £320,964 for generators and motors.

Description	Exports Value (£)		Imports Value (£)	
	May, 1959	May, 1960	May, 1959	May, 1960
Generators				
Diesel up to 200 kW	391,090	326,134		
Diesel over 200 kW	236,755	87,969		
Steam turbine driven	126,840	35,913		
Water and gas turbines	345,117	597,141	55,277	99,052
With i.c. and other prime movers	63,248	71,937		
Generators up to 200 kW	85,035	83,032		
Generators over 200 kW	90,259	70,645		
Generator parts	839,139	1,480,024		
Motors, f.h.p.	260,781	394,038		
Motors 1-250 h.p.	513,900	556,919	111,072	203,686
Other motors	528,214	342,760		
Motor starters and controllers	370,169	230,852		
Converters and rectifiers	117,838	81,006	170,721	101,394
Transformers	988,483	648,241		
Switchgear, to 200A, mv	470,169	333,718	85,659	176,106
Switchgear, other	1,207,618	908,338		
Total, Electrical Plant	*6,634,755*	*5,374,667*	422,729	*580,238*
Batteries, primary and parts	591,733	585,590		
Lamps filament, over 28 V	91,112	115,293		
Lamps filament, under 28 V	27,936	25,808		
Fluorescent and other lamps	124,567	113,079		
Radio and electronic gear	3,525,727	3,651,716	1,023,498	1,420,366
Telephone and telegraphic equipment	2,104,141	1,877,586		
Cookers	40,324	48,795		
Toasters	13,339	20,276		
Other cooking appliances and parts	138,555	132,309		
Space heaters	28,468	20,922	127,559	164,881
Water heaters	26,795	31,333		
Other heaters and parts	109,207	123,205		
Electric irons	80,030	71,067		
Vacuum cleaners	156,092	179,343		
Floor polishers	80,030	68,056		
Food mixers	79,430	61,370		
Washing machines, domestic	448,731	399,054		
Dryers		269,608		
Washing machine and dryer parts	77,827	81,568		
Domestic refrigerators and parts	954,072	904,995	245,684	962,106
Other appliances and parts	194,866	416,313		
Total, Domestic Appliances	2,427,766	*2,828,214*		
Portable power tools	213,083	246,846		
Arc welding plant	118,716	89,883	33,339	61,022
Resistance welding plant	15,860	25,139		
Electric furnaces	75,156	196,291		
Signalling apparatus	337,213	77,352		
Commercial instruments	154,872	217,454	127,360	188,714
House service meters	147,838	140,560		
Wiring accessories	267,310	233,389		
Fans	149,527	104,211		
Lighting fittings and lanterns	331,602	336,453		
Other lighting equipment	94,974	76,114		
Telephone and telegraph cable	518,412	272,455		
Paper insulated cables	861,117	500,902		
Rubber insulated cables	290,264	268,826		
Thermoplastic insulated cables	293,616	424,453		
Winding and similar wires	96,421	126,452		
Other cables and wires	207,093	203,139		
Total, all cables and wires	2,266,923	*1,796,227*		
Accumulators and parts	374,247	325,523		
Insulating materials	278,067	223,100		
Electrical ware	118,656	140,413		
Industrial electronic control gear	144,749	147,474		
Permanent magnets	53,300	75,884		
All other articles	2,570,112	3,385,287	1,126,329	2,067,721
Total	23,239,942	23,022,553	3,106,498	5,445,048

equipment for industry

Heated hoses

PUMPING power required for many liquids can be appreciably reduced if their viscosity is reduced by heating. Two types of hoses with braiding suitable for carrying an electric heating current have recently been introduced in a wide range of lengths and bores. The "Heronflex" has two concentric metallic braidings which can be connected together at one end of a hose and connected to a low voltage supply at the other. The braiding permits easy flexing of the hose and by making the inner braiding of high resistance steel and the outer braiding of copper a greater concentration of heat is applied at the inner surface of the hose. A cheaper form of heated hose, the "Evaflow," incorporates two concentric wire coils in the hose walls. Again, the inner coil has a higher resistance than the outer to give a better heat concentration. In both types of hoses, the electrical heating element also serves as a mechanical strengthener. *Heated Hose Ltd., Egerton La, Sheffield 1.*

Air flow switches

SWITCHES designed to indicate failure of flow or a serious change of flow rate in air ducts and incorporating mercury or micro-switches operated by an air vane are not always suitable for use in atmospheres contaminated by dust, corrosive fumes or with an excessive moisture content, the presence of which might lead to early failure through deterioration of the contacts or switch arm bearings. Recognising this, B. and R. Relays have modified their EO1 and EO2 relays which are now sealed against ingress of the surrounding atmosphere to the switch chamber without affecting the sensitivity of operation. They are available with either a micro-switch rated at 5 amp non-inductive or with one or two mercury switches rated at 3 amp non-inductive. *B. and R. Relays Ltd., Temple Fields, Harlow, Essex.*

Semiconductor prices down

A NUMBER of substantial price reductions, in some cases by as much as 25%, in their semiconductor products are announced by the Brush Crystal Co., of Hythe, who are associated with Clevite, of Cleveland, Ohio, and the Shockley Transistor Corporation and are major producers of semiconductor transistors and diodes, quartz crystals, piezo-electric ceramics and Rochelle crystals. Details of the reductions, which are already in force, can be obtained on application. *The Brush Crystal Co., Hythe, Hants.*

Cartridge soldering

FOR the occasion where electricity is not available and the soldered joint unavoidable, a cartridge heated soldering iron is an acceptable answer. Such devices do not require external heat of any kind, the bit being heated by an enclosed slow-burning thermic compound ignited by a small detonator. A unique design in this range is the "Quik-Shot," which also incorporates a detachable and interchangeable copper tip permitting the use of up to five different shapes and sizes to suit the work in hand. The "all-purpose" tip, a $\frac{1}{4}$ in. pyramid, which with the smaller $\frac{1}{8}$ in. pyramid is mainly for wiring. The $\frac{1}{8}$ in., $\frac{1}{4}$ in. and 1 in. chisel tips are for flat or large-surface soldering.

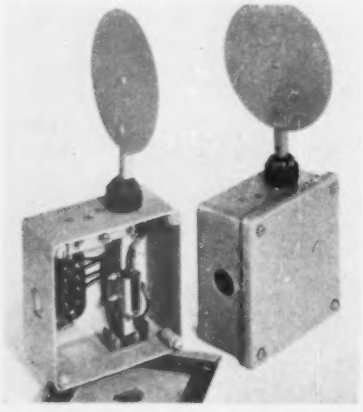
The cartridge, which raises the tip temperature to 460°C (860°F) within a few seconds and maintains it for 6-8 min., is enclosed within the housing behind the screw-in tip and is detonated by a spring-loaded firing pin in the handle. The price of the iron with one bit is £6; extra bits, 30-33s. Cartridges, in boxes of 12, 36s per box. *Jenolite Ltd. (Eng. Supplies Div.), 13/17 Rathbone St, London W.1.*

Price increase

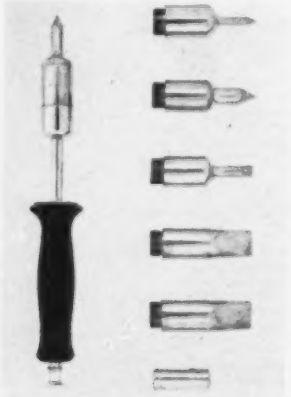
A PRICE increase of 5% is announced by Line Equipment on all quotations for insulators and allied line accessories, as listed in price schedules P.S.6 and X.P.S.6. This is the first increase notified by the company for some years and is due to recent rises in material and labour costs. *Line Equipment Ltd., 32 Queen Victoria St, London E.C.4.*

"Miniclip" volt-ammeter

A USEFUL and extremely portable volt-ammeter recently introduced by Ferranti Ltd., the "Miniclip," weighs less than 21 oz yet enables direct reading of voltage and current to within ±3% of full scale with a choice of three voltage and five current ranges. The ammeter is a fully insulated clip-on a.c. induction instrument and can be used on conductors up to 1in. dia at 600 V a.c. A plug with two leads and clips provides the voltage measurement on the same scale. The thumb-operated selector switch not only sets the range, but changes the scale so that multiplication factors are avoided. The voltage ranges are 0-150, 150-300, 300-750; the current ranges are 0-4, 4-12, 12-40, 40-120, 120-400. The meter movement is a d.c. element connected to the c.t. or potential divider through a small rectifier in the moulded black phenolic housing. Designed to give easy, quick and single-handed operation and supplied complete with cloth-reinforced plastics carrying case, it is not excessively priced at £19 12s 6d. The overall dimensions are 8 in. by $1\frac{9}{16}$ in. by $2\frac{1}{4}$ in. *Ferranti Ltd., Hollinwood, Lancs.*



These B & R airflow switches are sealed against ingress of moisture



The "Quik-Shot" cartridge type soldering iron has interchangeable bits for wiring and flat surface work

The "Miniclip" volt-ammeter is accurate to within ± 3% full scale reading on all its three voltage and five current ranges. Designed for single-handed operation on circuits up to 600 V a.c., it weighs under 21oz

for the electrical trade

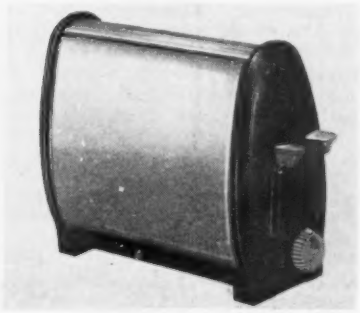
Commercial Prestcold

IN their latest commercial refrigerator Prestcold have introduced two important new features. The first is a system of heat dissipation from the condenser coil through the actual outer surface of the cabinet, which has the advantage of space economy as well as increased efficiency. This step forward was accomplished, we understand, by the use of more advanced thermal insulation methods. The other innovation is a twin-vane rotary motor compressor claimed to be unique. It is said to be more efficient and cheaper to run.

The cabinet to embody these advances is CC 132 "Conservator," a 13 cu ft model specially designed for the rapid freezing of dairy produce. Dimensions: 51¼ in. wide by 28⅞ in. deep by 39 in. high. The compressor is guaranteed for five years, the cabinet for one year. Price £145. *Prestcold Division of Pressed Steel Co., Swansea, Glamorgan.*

Four-round toaster

METWAY have recently contributed to the domestic toaster market by the introduction of a four-slice capacity model priced only £4 14s 2d retail. With economy in view, "Toastaway" abandons the pop-up idea in favour of plain cut-out, after a preset heating period of anything up to 60 seconds. Control is by a clockwork count-down switch. Instead of bread being sandwiched between two elements as in more expensive models, elements are now placed centrally with two slices on each side. After cutout, as in older type models, levers are depressed which drop the curved sides of the case outwards, flipping over the half-done slices for completion. The timer is reset for toasting the second sides. This appliance has polished stainless-steel casing with black moulded base and ends. Price, given above, includes removable connector and three-core flex. "Toastaway" should be available by mid-August. Loading, 700 W. List No. DA 3199. *Metway Electrical Industries, Canning St, Brighton.*



"Toastaway" semi-automatic turnover toaster £4 14s 2d

Free-standing infra-red fires

THE "Radisil" range of infra-red radiant heaters is to be extended to include two free-standing models. They consist of the luxury gold-plated reflector fires of familiar wall-fitting design, mounted on tubular tripod floor stands and fitted with mercury trip switches. They have vertical handles above the holders. Model 33 is a single unit, 600 or 800 W, 30½ in. long and 12 in. high. The other unit, No. 66, is a double model 15 in. high. This consists of two fires mounted parallel with each other and with independent switching for one unit. Prices, tax paid: single unit, £7 2s 7d; double, £11 5s 8d. The fires will be available by October. *Engelhard Hanover, Bath Rd, Slough.*

TRADE PUBLICATIONS

WOLF.—Build-up chart showing make-up of various attachments for use with all Wolf home power units, 14 in. by 9 in. Red Cord. Wolf Electric Tools Ltd., Pioneer Works, Hanger La, W.5.

DS.—80-page illustrated catalogue of industrial and domestic electrical accessories. D.S. Plugs, Blackpool Rd, Preston, Lancs.

LIDOMAT.—Pamphlet describing hot water systems. Heatrae Ltd., Norwich, Norfolk.

EKCO.—New price lists effective 20 June covering fluorescent fittings. Ekco-Ensign, 45 Essex St, W.C.2.

ARDENTE.—Illustrated technical brochure on miniature electronic components. Ardente Acoustic Laboratories, 12 Minerva Rd, North Acton, N.W.10.

STC.—12 technical leaflets, "Sound Reproduction Equipment" describing microphones, amplifiers and pre-amplifiers. Standard Telephones and Cables, Connaught Hse, Aldwych, W.C.2.

DIAMOND H.—Technical leaflet on series B, general purpose relays. Diamond H Switches Ltd., Gunnersbury Ave, W.4.

ALMA.—Technical leaflets on types A4, B, T and Y precision wound resistors. Alma Components, 55 Holloway Rd, N.19.

HONEYWELL.—Leaflet on automatic controls for industrial and domestic heating or ventilating. Honeywell Controls Ltd., Newhouse Industrial Estate, Motherwell.

TCC.—Technical Bulletin No. 55, 69, 74 on tubular condensers. The Telegraph Condenser Co., Radio Division, N. Acton, W.3.

"Comet" fan price

HILLMAN ELECTRIC MOTORS announce that their "Comet" extractor fan, described on this page in 16 June issue, is priced £6 17s 6d and not £6 12s 6d as previously stated. The fan now carries a three-year guarantee.

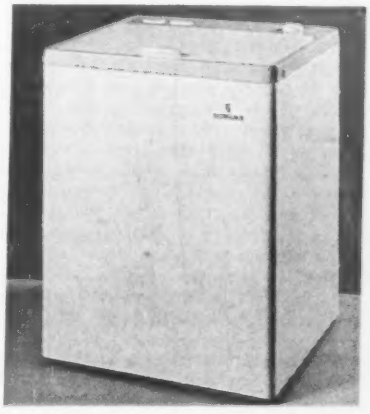
Dwarf drum washer

A NEW two-way spin drum washer from Germany, the Siemens WTE 3, should be welcomed in the smaller kitchen since it requires a remarkably low headroom of just over 2 ft. This is a 6½ lb capacity model, the horizontal drum being loaded from the top through an opening in its curved side. The drum, which is perforated, revolves at a moderate speed inside a main tank, the resulting turbulence aided by vanes and bars integral with the inside of the drum. Intermittent reversal action can be introduced by a separate control. Switches are at the top of the cabinet, behind the lid and provide independent control for motor and 2,700 W heater. The thermostat switch is colour-coded to indicate correct temperatures for various types of clothes. Dimensions are 20·1 in. wide, 17·3 in. deep, 24·8 in. high. Price £69 19s 6d tax paid. *Distributors: Lonor Ltd., 1 Maddox St, W.1.*

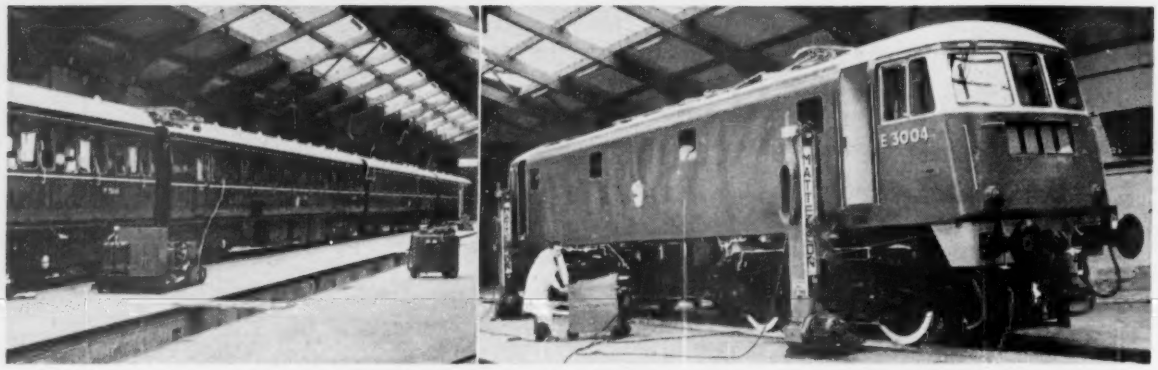
Low cost vacuum cleaner

A VACUUM cleaner priced £8 19s 6d retail, including eight accessories, is another Siemens product available here. "Rapid," a hand-held type cleaner, has a compact white container at the top end of the tube adjacent to the circular motor casing. These parts are protected from mechanical damage by a thick rubber ring. The handle, fixed directly to the motor casing has the weight fairly comfortably balanced under it.

Apart from the 19½ ft connecting cord, accessories included in the purchase price are long and short tubes, a carpet nozzle, brush, crevice nozzle, furniture nozzle, a spray gun and an atomiser. *Distributors: Lonor Ltd., 1 Maddox St, W.1.*



Siemens WTE 3 drum washer, £69 19s 6d, is only 2ft 0¾ in. high



Maintenance Depot for Electric Locos

ELECTRIC locomotives and multiple unit trains operating in the Manchester area will be maintained at the Longsight depot which has recently been opened. It is planned that the depot will be fully operational by the time the 25 kV a.c. commercial service between Crewe and Manchester opens in September this year. Besides dealing with 3,300 h.p. a.c. locos and four-car a.c. multiple-unit trains, the depot will be the maintenance centre for a.c. overhead and distribution equipment in the Manchester area.

The main building in the depot is a maintenance shed provided with two through roads each having a 270 ft long inspection pit. The length of the bays is fixed by the decision to deal with rolling stock on a unit basis.

Both roads through the maintenance shed are wired with 25 kV overhead equipment at 17 ft 3 in., the contact wire over No. 1 bay being erected with a maximum stagger of 18 in., so that a specially designed mobile crane can remove pantographs and auxiliary equipment from the locos. Inspection pits are fully lit by recessed electric light fittings spaced at regular intervals and have provision for use of inspection lamps and other portable electrical equipment. Alongside one pit is a 30 in. wide jacking strip, running its complete length, which allows the use of four 20-ton electrically operated jacks for lifting electric stock in an emergency (shown above in the illustration on the right).

Motorised switches located at either end of the shed isolate the 25 kV equipment when necessary. The switches are remotely controlled from a panel in a central position in the maintenance bay; they are provided with lock-off equipment in the interests of staff safety.

Maintenance equipment provided in the depot is constructed in transportable form wherever possible to give maximum flexibility. The main items are a 6-ton mobile crane, electric screw jacks, a compressor, power lubricators and battery chargers. The mobile crane has been specially designed to remove pantographs and auxiliaries from the rolling stock with the overhead equipment merely isolated and earthed, not moved aside physically. The lifting jacks already mentioned can be operated independently or the four can be controlled as a group from a control console. The battery charger is also fully transportable and is specially designed to suit batteries of all types of stock, having both automatically and manually controlled charging brakes. The illustrations above show the portable maintenance equipment.

The electrical installation throughout the depot consists of fluorescent lighting fittings supplemented by tungsten fittings. All socket-outlets within the workshops and maintenance shed are of earth-proved type, which permits the use of portable equipment worked at mains voltage. However, a number of low-voltage socket-outlets are installed for supplying hand lamps.

CONTRACTORS

Electrical contractor ..	W. J. Furse Co.
Welding equipment ..	English Electric Co.
Local control apparatus	Electric Construction Co.
Trucks and trolleys ..	Geest Industries
Lubrication equipment	Wakefield Dick Industrial O'ls
Vacuum plant	Sturtevant Engineering Co.
Lifting jacks	Matterson
5 kVA supply transformers	Woden Transformer Co.

Epoxy Resins for Jointing

THE replacement of bitumen or bitumenised compounds for insulating cable joints by the epoxide resins is on the way to becoming a major revolution in the electrical industry with the development of newer grades of resins with their specialised hardeners, plasticisers (or "flexibilisers" as they are sometimes called) and with the growing use of polythene and p.v.c. for insulation and sheathing. The obvious advantages in the use of the resins are the avoidance of cumbersome heating equipment and the self-supporting characteristics of the hardened resin which avoids the necessity of metal joint boxes. The saving in time and labour offsets the higher costs of the resins as compared with bitumen but even these can be reduced by the use of extenders so that epoxide resin formulations can now be obtained for as little as 3s 4d per lb.

Among the latest to be developed for this specialised duty are three marketed by Bakelite Ltd., list Nos. R.18774/1, R.18774 and R.19019, the latter being particularly suitable for use with p.v.c. insulation. Hardeners for these resins are listed as Q.18814, DQ.19101, DQ.19125 and D.19129. The first is a highly reactive hardener with a minimum irritation potential; DQ.19125 is a low cost hardener which gives good results with p.v.c. cables. A useful guide to this aspect of jointing is the advance information leaflet E.40 published by Bakelite Ltd. from 12-18 Grosvenor Gardens, London S.W.1. This lists typical formulations of the above resins, hardeners and some extenders which can be used as a guide to developments in jointing techniques.

The company, which has already done a great deal of development work in this field and is still actively engaged in research on polyester resins for jointing, will be pleased to give further information on request and to co-operate with cable companies and others interested. Epoxide resins are characterised by their excellent adhesion to metals and tapes and also to p.v.c. insulation which has been treated for the purpose. Several cable manufacturers have already exhaustively tested and approved the resins.

News of the Week

SCOTTISH TARIFF CASE JUDGEMENT

South of Scotland E.B. absolved from Actions

THE longest legal case on electricity tariffs has reached round three with a decision in favour of the South Scotland Board and the successors of the BEA. A 12,000-word judgment was given in Edinburgh last week, in the action brought by the British Oxygen Co. and another, originally in 1954, and has since been to the House of Lords twice on points of interpretation.

The question raised was the difficult one of undue discrimination. The tariff of the board over the years in question provided a reduction of 5·55% in the unit charge for h.v. consumers compared with the charge for supplies under 6,000 V. This tariff was subject to a coal cost adjustment clause which did not reflect this difference and in consequence the actual price per unit paid by h.v. consumers showed a differential of less than 5·55%. It was argued that this provided discrimination between the two classes.

In the two hearings before the Lords, it had been held that the cost of distributing electricity as between one class of consumer and another was relevant in considering if undue discrimination had been exercised against any particular class of consumer. Discrimination may be undue discrimination although it was not exercised for illegitimate reasons. On the second time the case was before the Lords, the Board's argument that undue discrimination could only be judged by the price paid by the consumer was rejected.

Giving judgment in the Court of Session last week, Lord Guest said that the figure of 5·55% could not be taken as a proper differential which the Board was bound to write into every tariff. The tariff was a notional price based on coal at 38s per ton, whereas in fact coal never fell below 61s 10d during the period in question. To ascertain the true differential it was necessary to look at the actual price of coal.

He was of the opinion that the firms' counsel had failed to establish that 5·55% was the minimum differential between h.v. and l.v. consumers which would unduly discriminate against the former. The only justification for the marginal figure of 5·55% was that it represented the difference with coal at 38s per ton.

The companies also claimed that they suffered undue discrimination by being charged under a monthly m.d. tariff and not being offered the alternative of an annual m.d. tariff, the price content of which was ten times the monthly charge.

It appeared to his lordship an impossible proposition that the firms should be able to dictate to the defenders the form of tariff which they should be offered and the defenders should be bound to give them the alternative of an annual maximum demand charge without altering the money content in the monthly charge.

The Board were directed by the Electricity Act to secure that the revenues were not less than sufficient to meet their outgoings. The Board's witnesses accepted that the revenue would have to be made up but suggested this might be done by increasing the charges to consumers other than industrial.

But, said Lord Guest, this might result in undue discrimination against those other consumers.

(It may well be that this decision will prove to be the end of this marathon case, for although an appeal may be entered a balance of view suggests that such a step may not be taken. It is believed that the amount involved was approximately £10,000.)

CASE HISTORY

Dec. 1954: Action started in Court of Session against SW Scotland EB.
Jan. 1955: On appeal, Second Division reversed decision and allowed a proof.
July 1956: Board appealed to House of Lords who held case to be relevant and sent it back to Court of Session for proof.
May 1957: With amended pleadings by Board, Lord Hill Watson held that the tariffs showed undue discrimination against the company, and proof was again allowed.
July 1957: Board appealed, but British Oxygen Gases appearing in case for first time, sought to interdict the Board from operating their tariffs. An interim interdict granted; was withdrawn later in 1957 and that decision confirmed by the Second Division.
In 1958: The Second Division of the Court of Session allowed a proof.
April 1959: Board lost an appeal to House of Lords who agreed that there should be a proof.

Now h.p. curb freezes 'fridges

A FALLING-OFF in home sales of domestic refrigerators due to the hire-purchase restrictions introduced at the end of April by the Chancellor of the Exchequer is blamed for further redundancy sackings in the appliance industry. Last week Kelvinator announced that they would dismiss more than 100 of their employees, some 10% of a total payroll of 1,100.

A spokesman of the company said that in common with other domestic appliance manufacturers they had experienced a reduction in home market demands following the h.p. curb. Although export sales had continued at a high level, enabling them to keep up production, they had now reached a point when they must reduce output.

Trade union officials and management were working together to see that as little hardship as possible was created. The dismissals were expected to start this week. The company believe that the redundancy is only a temporary phase and that their employment will be back to normal next season.

The h.p. curb was also blamed by Hoover for their redundancy dismissal of 800 employees (reported in last week's issue) which was later deferred following strikes at two of their factories (see further report below). (Reference to appliance sales decline in both Canada and the USA is made on page 1054.)

'Fridge Exhibitors Group formed

A NEW organisation representing companies in the refrigeration and air-conditioning industries who plan to exhibit at the second International and Air-Conditioning Exhibition at Earls Court in April, 1961, has been formed. Known as the Refrigeration Industry Exhibitors 1961 Group, the organisation, under the chairmanship of Mr E. G. Batt, of Marco Refrigerators, will supervise exhibition policy and maintain liaison between exhibitors and organisers.

Hoover strike ends

WORK was resumed at Hoover's Perivale and High Wycombe factories last Thursday when the 2,500 employees, who had been on strike for a week, went back following discussions between the engineering employers' organisation and trade union officials.

It was agreed that there should be full resumption of normal working without victimisation on either side and that a conference should be held as soon as possible at the Perivale works, with officials of the trade unions concerned and of the London Association of the Engineering and Allied Employers' Federation participating, to explore and discuss all aspects of the problems from which the dispute arose, including alternatives to dismissals.

The strike was called in protest following the company's recent announcement that 800 employees were to be dismissed as redundant.

Tyneside objects to 275 kV line

PLACING 3½ miles of 275 kV cable underground would cost £1,167,000 it was stated at a public inquiry at Jarrow last week into the proposal of the CEGB to erect an overhead line from the River Tyne to Boldon substation. The section was part of a 50-mile-long line proposed from Blyth power station to Lackenby.

The section from the Tyne to Boldon, which was the subject of the inquiry, was the only part which had raised planning difficulties. The cost of an o.h. line, supported on towers 136 ft high, would be £23,500 a mile. The towers would be about 1,200 ft apart and have a ground clearance of 25 ft, with 20 ft allowed over buildings. Mr S. R. B. Cooke, for the CEGB, said that four alternative overhead routes had been suggested, but all the objectors had raised the question of underground cables. Owing to the cost, this was not a practicable proposition.

Replying to Mr A. Stansfield, deputy town clerk of South Shields, he said that the cost of an underground cable would include £20,000 a mile for excavating. He said that the CEGB had not considered placing the cable on the ground in open country, protected from the public, as this would not be a desirable plan.

Mr Stansfield pointed out that over 1,000 houses were within a quarter of a mile of the route known as "B." South Shields felt that the cable should be underground and contended that the cost would not be high in relation to the money already spent on housing by the Corporation. They asked for another route covering part of Tyne Dock to be considered.

Alderman A. I. I. Southwick, of South Shields, said o.h. cables on a housing estate would have a bad psychological effect on residents, and Mr W. A. Geenty, Durham County Planning Officer, also maintained that the line and towers would be extremely damaging, if not disastrous, in its effect on visual amenity.

Jarrow T.C. also made similar objections to two routes. After closing the inquiry on Thursday, Mr A. H. F. Linton, deputy chief engineering inspector, Ministry of Power, and Mr A. R. Chown, a senior inspector, Ministry of Housing and Local Government, visited the areas concerned.

More diesel locos

ANOTHER 170 sets of diesel engines and transmissions for main-line diesel locomotives, which are being built in British Railways' workshops, have been ordered by the British Transport Commission. Of the total order, valued at £11 million, 91 of the locomotives will be of the diesel-electric type, the others being diesel hydraulic.

Teaching the Teachers

THIRTY professors of electrical engineering from leading universities and technical colleges in Britain, together with three colleagues from overseas, will attend a summer school organised by AEI (Rugby) Ltd. from 11 to 15 July. The professors will listen to engineers —in some instances former students— lecturing on the latest developments in electrical and electronic engineering.

The Duke of Edinburgh discussing with Mr W. Hutton, deputy chairman of the South of Scotland Electricity Board, methods of crop conservation by electricity when visiting the Electricity Stand at the Royal Highland Show, Edinburgh, recently. On Mr Hutton's right is Mr J. W. Moule, chief commercial officer, S of S EB

£1 million for S. G. Brown

THE Admiralty is to receive the equivalent of £1 million for S. G. Brown Ltd., the gyro-compass firm at Watford which is being acquired by de Havilland Holdings Ltd., it was disclosed in the Commons last week by Mr Orr-Ewing, Civil Lord of the Admiralty.

The cash price of £775,000, payable this week, includes full repayment of Admiralty loans of £215,000, and the purchasers are also assuming responsibility for a bank overdraft of £440,000. When the firm was taken over by the Admiralty in 1942 as a wartime measure the price paid was only £55,750, but since 1948 new share capital and advances totalling £600,000 have been provided from Navy votes. The Government would thus appear to be making a profit of some £344,250 on the deal.

NO CABLE TAP

IT has been established that the four breaks in the transatlantic cable system linking Britain with Canada and the USA were caused by fishing trawler operations, the Postmaster-General stated in the House of Commons last week. Tapping submarine cables would present formidable technical difficulties and "it could certainly not be achieved by breaking the cables." In general there had been no increase in underseas cable breaks, but following more than two years' immunity, the four breaks referred to above had occurred since Feb. 1959.

Nuclear Link-up Confirmed

LAST week Atomic Power Constructions and the GEC/Simon-Carves nuclear energy group formally announced that they had agreed "to join forces to design and build nuclear power stations in this country." This move reduces to three the number of consortia competing for power station orders from the CEGB and other UK generating authorities.

The others are the Nuclear Power Group (formed from the Parsons/Reyrolle based Nuclear Power Plant Co. and AEI/John Thompson Nuclear Energy Co.) and the English Electric/Babcock and Wilcox/Taylor Woodrow group.

Involved in the new group are GEC, Simon-Carves, Motherwell Bridge and Engineering and John Mowlem from the GEC/Simon-Carves group; and Richardsons Westgarth, International Combustion, Crompton Parkinson, Fairey and Trollope and Colls from Atomic Power Constructions. At present, each of the original groups has an order for one nuclear power station in the UK, while GEC/Simon-Carves are also building a nuclear power station in Japan.

OFFICIAL PUBLICATIONS

UK Trade Mission to the Egyptian Region of the United Arab Republic. Report of. HMSO. 3s 6d.

Washing Facilities (Running Water) Exemption Regulations, 1960. SI No. 1029. HMSO. 3d (see page 1068).

Electrical Safety in Hospitals—Electro Medical Apparatus. Ministry of Health Circular. HM(60)48 (see page 1052).

National Council of Technological Awards. Report for period April, 1959-March, 1960; Memorandum on industrial training of students following courses leading to Dip. Tech. (see page 1046).

BS 3238. Graphical Symbols for Components of Servo-mechanisms. Part 1. Transductors and magnetic amplifiers. 4s 6d.

European Free Trade Association (Origin of Goods) (Amendment) Regulations, 1960 (SI 1960, No. 1043). HMSO. 3d.

G.E.C. Appliance Service

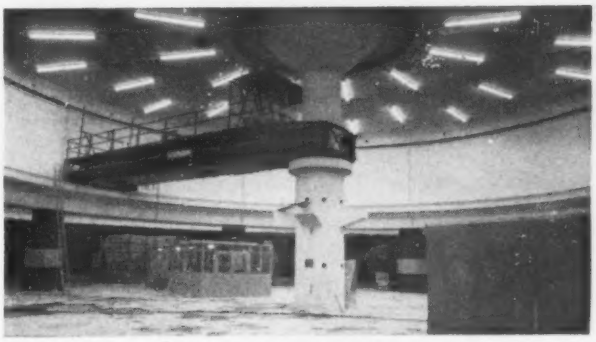
A NEW central area service department for domestic equipment has been set up by GEC Ltd., with premises in Newhall St, Birmingham (tel.: Central 7081). The depot opens tomorrow (1 July) under the management of Mr D. W. Smith.

All repairs of domestic equipment and appliances for the Nottingham, Stoke and Leicester branch areas of the company will be carried out at this service depot and field service calls for those areas organised from there. Spare parts for domestic equipment will continue to be available from local GEC branches.

Repairs of fans, radio and television equipment should continue to be sent to the local branch.

Libel Action Ends

The libel and slander action against Sir Harold Bishop, Director of Engineering, BBC, brought by Mr L. J. Peerless, a former BBC employee, was dismissed in the High Court of Justice on Monday. Mr Justice Havers ruled that there was no evidence of publication of the words complained of. He gave judgment for Sir Harold, with costs.



AEI cold-cathode lighting, laid out on a sectional plan with lighting "spokes," has been installed in the magnet room built by the UKAEA as part of the £7,000 Synchrotron project for the National Institute for Research in Nuclear Science at the Rutherford high energy laboratory at Harwell

TRIBUNAL FOR PAY CLAIM

THE case for "a substantial increase" in wages for 120,000 manual workers in the electricity supply industry, which has been referred to arbitration, will be heard by the Arbitration Tribunal under the chairmanship of Mr Roy Wilson, Q.C. He will sit with Mr W. L. Clarke and Mr E. J. Hill. The tribunal will meet on 5 July.

Mr Wilson is Recorder of Croydon and a member of the independent panel, Industrial Court. Mr Clarke is concerned with the quarrying industry, and until 1953 was a member of the employers panel, Industrial Disputes Tribunal. Mr E. J. Hill is general secretary of the Boilermakers Union.

The wage claim was originally made earlier this year by the unions shortly after the reduced working week—from 44 to 42 hours—was put into operation. The electricity boards rejected the claim but offered to re-examine the matter after 30 June, by which time the effect of the shorter week would be known. The boards also offered arbitration, and after the parties failed to agree an approach was made to the Minister of Labour, who has now set up the Tribunal.

DEVELOPMENTS IN BUSINESS

Edmundsons unite Midlands interests

FROM 1 July Edmundsons Electric Co. Ltd. are amalgamating their interests in the Midlands under the title Edmundsons (Midlands) Ltd., which will embrace the following subsidiaries:

F. Westerman (Wholesale) Ltd., Dale End, Birmingham 4; Electro-Mechanical Supplies Ltd., The Butts, Coventry, and at Linden St, Manchester; Edmundsons Electrical Wholesalers Ltd., Queen St, Albert Sq, Manchester 2.

The move will enable the firms trading under the new title to provide a better service, collectively, throughout the Midlands by making available to all customers, stocks held at any branch. The new organisation will be under the joint control of H. E. Bagnall and G. Lockwood, directors formerly in charge of F. Westerman (Wholesale) and Electro-Mechanical Supplies.

Spark acquire two companies

TWO companies have been acquired by Spark Holdings Ltd. at an overall purchase price of £¼ million, of which £200,000 is in cash. The companies are Hawke Cable Glands Ltd. (£100,000 cash plus 250,000 Spark 1s Ordinary shares), and J. T. Price and Co. (Brass and Aluminium Founders) Ltd. (£100,000 cash plus 375,000 shares). Each of the acquired firms has shown an average annual profit of some £50,000.

Mr W. Hawke (managing director of Hawke Cable Glands) and Messrs W. Sweetmore and J. D. Sweetmore (joint managing directors of J. T. Price and Co.) retain their appointments under long-term service agreements.

£1 million take-over

THE £360,150 issued capital of James Stott and Co. (Engineers) Ltd. has been acquired by Glover and Main Ltd., engineers and domestic appliance manufacturers, for £1,080,450 (£3 per £1 share) cash. James Stott, makers of hotel catering and canteen equipment, had net assets of over £650,000 at the end of last year, and the profit for 1959 before tax was £183,099.

Power transistor agreement

GERMANIUM power transistors of the n-p-n type are shortly to be manufactured and marketed by Semiconductors Ltd., using production equipment acquired from Sylvania-Thorn Colour Television Laboratories Ltd. The transistors, which were developed by Sylvania-Thorn, will be specifically for use in industrial applications and are a departure by Semiconductors into fields other than specialised high-frequency types.

Components firm purchased

THE share capital of Gillone Electric Ltd., manufacturers of precision component parts for the radio and television industry, has been acquired by Kangol Ltd. (beret manufacturers) for £150,000 cash.

Simplex in Hull

A NEW depot for Simplex Electric Co. Ltd. at Wyke St, Hull, was officially opened last week by Mr D. Bellamy, chairman of the Yorkshire Electricity Board. Simplex, who make Creda domestic appliances and a wide range of switchgear and other installation equipment, have 23 branches already open throughout the country. The new branch is part of the firm's current expansion policy and will improve service in the Hull area.

Machinery on Lease

A NEW company, Mercantile Leasing Co. Ltd., has been formed by the hire purchase finance house, Mercantile Credit Co. Ltd., to lease capital assets, new machinery and equipment, fleets of cars, vehicles, etc. The company is being formed in conjunction with the United States Leasing Corporation of San Francisco, who will have a 20% holding in an initial capital of £100,000.

Mr Richard B. Hurton, chairman of the new subsidiary (and managing director of Mercantile Credit) pointed out that the advantage of leasing was that it freed working capital for more profitable use and preserved bank credit for normal operating needs. Rentals were "tax deductible." Leasing period would normally be five years after which the lease could be continued at a prearranged fractional rent. The new company has its offices at 7-8 Savile Row, London W.1.

This 10-ton capacity Eezion articulated trailer has been exported to Hong Kong where it will be used by the China Light and Power Co. for moving cable drums, transformers and other electrical equipment. The trailer, supplied by the Ibbett Engineering Co. Ltd., has a platform area of 17 ft 6 in. by 5 ft 7 in. fitted with a 2-ton loading winch. Retractable suspension enables the platform to be raised hydraulically to and from ground level

Welding Visit to Russia

A DELEGATION from the British welding industry left London last week to visit the USSR at the invitation of the State Scientific and Technical Committee of the Council of Ministers of the USSR. Led by Mr D. J. W. Boag, managing director of Rockweld Ltd., the delegation will tour the Welding Exhibition in Moscow as well as visiting factories.

Other members of the delegation are: Mr R. L. Swan, director and general manager, Lincoln Electric Co.; Mr G. M. Harvey, development director, British Oxygen Gases; Mr G. H. Moule, chief engineer, heating and welding dept., AEI (Manchester); Mr W. S. Simmie, welding engineer, Pressed Steel Co.; Mr D. Wyllie, welding engineer, Babcock and Wilcox; Mr R. H. Boughton, welding engineer, English Electric; Mr T. F. Tribe, managing director, British Federal Welder and Machine Co.

This technical mission is to be followed by a reciprocal visit to the UK by Russian technical experts. The visits have been arranged by BEAMA.

Speed-up in Coal-fired Stations

ONE effect of the slow-down in nuclear station building announced in the recent Government White Paper is that the CEGB will have to accelerate its building of coal-fired stations if anticipated demand is to be met. A statement this week indicates that previous plans for coal-fired plant for commissioning in 1965 and 1966 will have to be increased by 1,300 MW to offset the assumed nuclear plant, which will not now be available.

Moreover, there has been some notching up of forecasts of demand in those years in the light of recent experience of load growth, a circumstance which underlines the need for vigour in the coal-fired station programme.

The CEGB say that they can achieve the necessary advance provided they obtain consents from the Minister of Power by the end of the year for stations including West Burton, Holme Pierrepont (near Nottingham) and Tilbury, with capacities of 2,000 MW, 2,000 MW and 1,400 MW, respectively.

That word "guarantee"!

SOME months of agitation against the rural electrification guarantee system of the Electricity Board for Northern Ireland culminated in a motion in the Ulster Commons last week for the alteration of the present policy. Defending the existing scheme Lord Glentoran, Minister of Commerce, said he considered it realistic and should be continued. The rate of progress had been steady and had been achieved by a solvent undertaking selling electricity at attractive prices.

In ten years the board's capital expenditure on rural electrification amounted to £7,366,137, providing supplies to 54,105 premises, and the guarantee for the first five years had been reduced to 19% of the connection cost.

Perhaps it had not helped to refer to the annual payment as "the guarantee," meaning that the consumer must show that he would honour the contract which he had entered into, Lord Glentoran went on. Whatever its origin, he would be glad if the use of the word "guarantee" could be discontinued. Ultimately the motion was talked out.

Two £½ million mill equipment orders

A.E.I.

CONTRACTS for rolling mill drives worth nearly £½ million and totalling 14,000 h.p. have been placed with AEI's Heavy Plant Division by three steel companies. Motors accounting for half this horsepower are to be installed in the Stocksbridge (Sheffield) works of Samuel Fox and Co. Ltd.; the other orders are from Head, Wrightson Machine Co. Ltd. and the South Durham Steel and Iron Co. Ltd.

The Samuel Fox order is for a 5,000 h.p. d.c. motor, auxiliary motors and control equipment for a new 40 in. hot-reversing mill, powered from a mercury-arc converter installation rated at 4,000 kW; also a 2,000 h.p. motor and control equipment for a 27 in. retractable mill.

For Head, Wrightson, AEI are supplying two 2,000 h.p. motors for the main drive in the seamless-tube mill, together with mercury-arc rectifiers and control equipment. The remaining order is for a 3,000 h.p. d.c. drive for the South Durham Steel and Iron Co.'s new universal beam mill.

English Electric

A £½ million contract for electrical equipment for a new 148 in. four-high hot aluminium rolling mill—said to be the largest of its kind in Western Europe—and for a new 72 in. cold strip mill has been awarded to the English Electric Co. by James Booth Aluminium Ltd. The equipment is to be installed in the company's Kitts Green works at Birmingham early next year.

The equipment includes main motors for the four-high mills and edging mill, as well as a large number of ancillary motors, converting equipment, control gear and switchgear. The order also calls for auxiliary equipment for lubricating and ventilating purposes.

The new mills, which are being designed and supplied by the Loewy Engineering Co. Ltd., Bournemouth, are part of James Booth's recently announced £5 million expansion programme and, when fully operational in 1962, are expected to increase the company's flat-rolled production of aluminium sheet by some 500%.

Why no domestic block storage heaters?

ELECTRICITY boards were unwilling to sell block storage heaters for use in domestic premises because of the high rate of tax they attracted; further, the industry was threatened that if such heaters were sold for domestic purposes the purchase tax charge would be applied to industrial storage heaters as well, Mr A. Woodburn, M.P., said in the House of Commons last week. He was asking the Chancellor of the Exchequer to reduce the rate of tax on storage heaters used for domestic purposes.

The position at the moment was that because of the tax threat the domestic block storage heater as such did not exist.

Replying, the Chancellor said that there was no restriction by the Treasury on the sale of such heaters for any purpose, but as all domestic heating appliances were taxed at 25% it would not be reasonable to discriminate in favour of the storage heater by reducing the tax payable on domestic units.

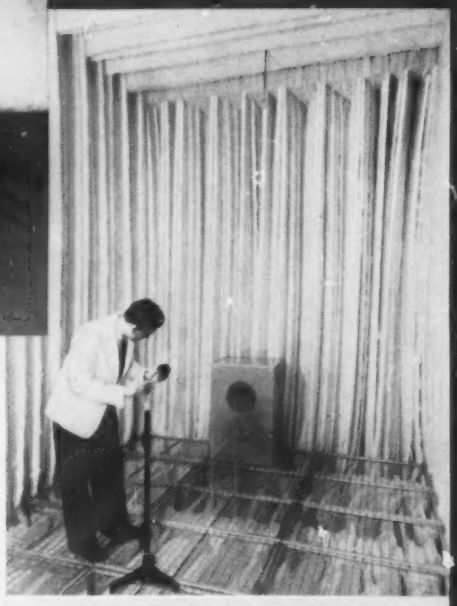
For Testing Electronic Apparatus

Isolating a 40-ton sound-proof room from ground vibration

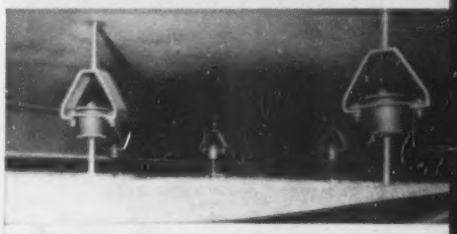
Dawe Instruments Ltd., wished to isolate from ground-borne vibration a 40-ton anechoic chamber used for the calibration of sound level meters.

The chamber was mounted on eight Metalastik sandwich type insulators giving a static deflection of 0.25". These are giving excellent insulation against ground-borne vibrations with disturbing frequencies of 1000 cycles per minute and upwards.

In most cases trouble from vibration, or noise due to vibration, is most easily overcome by isolating the disturbance at source. Among the many Metalastik anti-vibration mountings for industrial machinery, lifts and ventilating equipment is the famous "Cushyfoot". A brochure on the application of Cushyfoot mountings to a wide variety of machines is available on request.



Anechoic and Reverberation chambers at the Hemel Hempstead laboratories of the Acoustical Investigation and Research Organisation Ltd.,—independent consultants in Acoustics—are supported on large rubber-bonded-to-metal mountings supplied by Metalastik. Photograph shows interior of the Anechoic chamber.

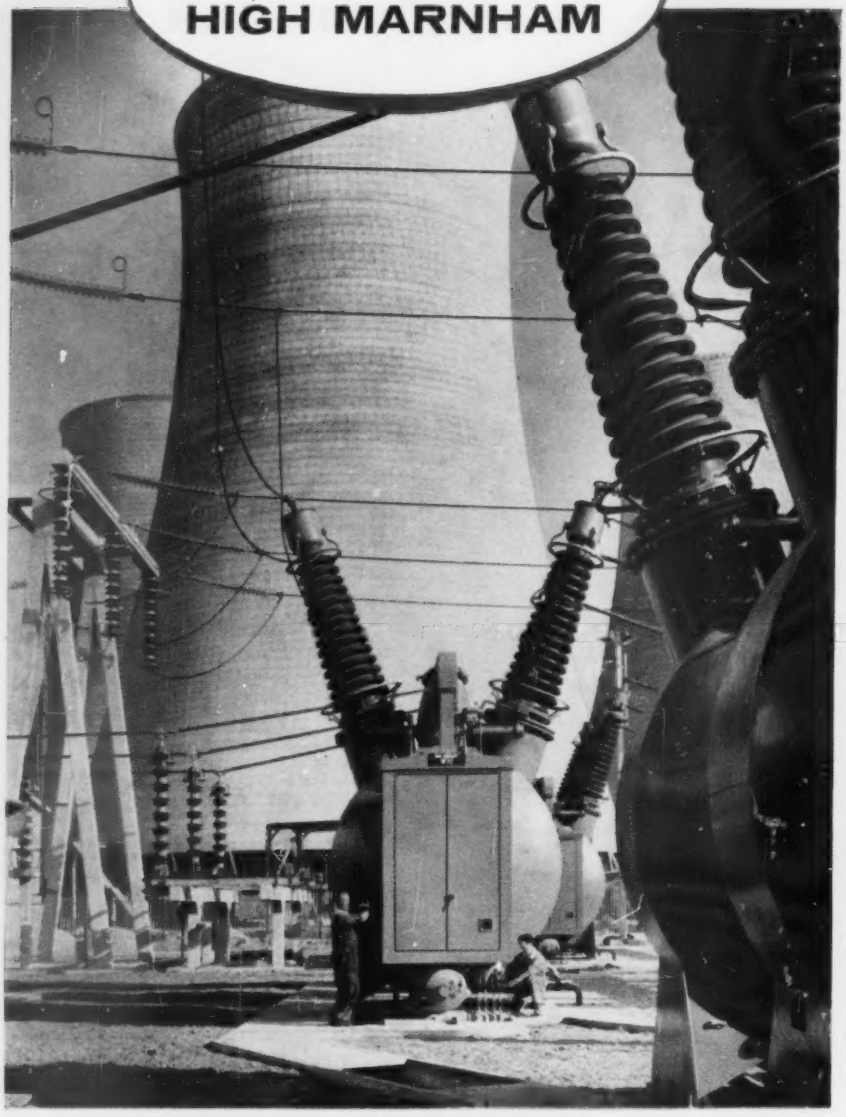


An acoustic ceiling suspended on "Metacone" anti-vibration mountings which bring the natural frequency of the ceiling below the audible range and thus prevent resonant vibration due to airborne noise. Photograph by courtesy of Werkspoor N.V., Amsterdam.

METALASTIK

METALASTIK LTD., LEICESTER

AEI SWITCHGEAR at HIGH MARNHAM



—When commissioned, this will be the largest thermal station in Europe.

At this C.E.G.B. power station the 16-switch, double busbar switching station is equipped with 275-kV 7500-MVA lenticular tank oil circuit breakers. The AEI circuit-breakers of this type, selected for the new Thorpe Marsh Power Station, will be the first in Great Britain to be rated at 15000-MVA.

In addition to the outdoor switchgear illustrated, AEI has provided the 6.6-kV 350-MVA High Marnham station auxiliary equipment.

For further details, write to AEI Switchgear Division, Willesden Works, Neasden Lane, London, N.W. 10 or to your local AEI Office.

AEI **Switchgear Division**

Willesden, London · Trafford Park, Manchester
Higher Openshaw, Manchester

Associated Electrical Industries Limited

F/A001

THE EUROPEAN SCENE: BRITAIN'S PROSPECTS IN PATTERN OF SIX AND SEVEN TRADE

Why can't Britain join the "Six"?

IT was often asked why Britain did not simply join the Common Market as a solution to European trading difficulties, Mr F. J. Erroll, Minister of State, Board of Trade, said in Hamburg last week. "There are a number of reasons," he explained. "We are not in any way self-sufficient in the United Kingdom and most of our trade is not in Europe. Our trade policy and arrangements, in particular our system of free entry for Commonwealth goods and of Commonwealth preferences, is designed for a world outside Europe.

"To assume the tariffs of the Common Market and to place tariffs on imports where no tariffs had been seemed a curious step to have to take in order to obtain greater freedom of trade," Mr Erroll added. Referring to "the encouraging picture of continuing development since the war" in Anglo-German trade, he warned that there was "a shadow over the future." The new tariff arrangements to be applied by the Six and the Seven trading groups would lead to a loss of trade in markets where trade had been building up successfully.

The UK was ready to exchange important tariff reductions over a wide range of our imports for a comparable reduction in tariffs against our exports, but this was essentially a short-term solution. Meanwhile, Britain would continue to work towards some form of wider trading arrangements in Europe than the Six and the Seven.

New O.E.E.C. Convention

A MEETING of Ministers of the 18 member Governments and two associate members of the Organisation for European Economic Co-operation will take place towards the end of July to discuss a draft convention for the reconstitution of OEEC, the Secretary of State for Foreign Affairs said in the Commons last week. Discussions would be based on the report prepared by the group of four experts recommending the lines on which the organisation should be remodelled.

"Cover" Group needed

SOME kind of "cover" organisation, joining the Six and Seven together, might solve the problem of relations between the two trading blocks, Mr Erroll, Minister of State, Board of Trade, said in Bonn last week. The alternative, "a series of palliatives for the removal of sore spots," would not produce concrete results and would merely lead to a self-prolonging process that might go on for years.

Mr Erroll denied reports that Britain was thinking of entering the Common Market. Referring to the proposal that Britain might join Euratom and the Coal and Steel Community, he said that this could only happen as part of a long-term solution of the whole problem and in full agreement with other countries of the Six. Meanwhile, the UK was still pinning its faith on the 21 nation trade committee (which met recently for talks in Paris) as the means by which the next step might be taken.

E.F.T.A. regulations amended

CERTAIN minor additions and amendments have been made to the European Free Trade Association (Origin of Goods) Regulations, 1960, which give effect to the provisions of the Stockholm Convention for determining eligibility for area tariff treatment of products traded among member countries of the Seven. The additions and amendments are mainly the result of decisions taken by EFTA members after the regulations were published on May 3. (See Official Publications, page 1064.)

U.K. and Euratom

THE Government is prepared to consider anew the proposal that Britain should join Euratom as part of a wider settlement in Europe, the Secretary of State for Foreign Affairs stated in answer to a Parliamentary question last week.

Meanwhile, at a meeting of the six members of Euratom and the Government at the Foreign Office last week both sides expressed reservations, and the discussions were concerned largely with preliminary procedural aspects of the problem. The uncertain factor would seem to be whether the Six are prepared to accept the UK as a member of Euratom (and of the Coal and Steel Community) without British agreement to join the European Economic Community also.

A further meeting between the British Government and representatives of the Euratom countries is planned for next week.

Capital Expenditure Increasing

LAST week's increased Bank rate and special deposits shock is underlined by the latest Board of Trade figures which show the trend of industrial expansion during the first quarter of this year, before the Chancellor took steps to restrict home market consumption by imposing the controversial h.p. curb.

Capital expenditure by manufacturing industry during the first three months of 1960 was 12% higher than in the same period a year earlier after falling continuously for the previous seven quarters. Expenditure by "other industries and services" rose by 27% in the same quarter. Taken together, these two broad industrial groups showed an increase of about 19%.

But, with imports increasing at a faster rate than exports, and wage demands growing again after some two years of general quiescence and price stability, these apparently healthy figures showing vigorous industrial expansion have caused concern in Governmental quarters.

Manufacturers' stocks and work in progress during the first quarter of 1960 rose by £121 million—a 2½% gain and the largest during this period since 1957. Wholesalers' stocks rose by £14m (1%).

Agreement on Tin

TWENTY-THREE countries taking part in a United Nations sponsored conference of tin producing and consuming States last week unanimously approved a new international tin agreement which will, if ratified, be effective for five years from July 1, 1961.

The agreement leaves unchanged present floor and ceiling tin prices of £730 and £880 a ton but reduces the size of the buffer stock from the equivalent of 25,000 tons to the equivalent of 20,000 tons (initially 12,500 tons in tin metal and the equivalent value of 7,500 tons in cash).

"Which?" and TV Sets

IN our issue of 19 May we summarised a report by Consumers Association Ltd. in their publication *Which?* and indicated that one television set which received a "just acceptable" rating was a portable model. In fact, the set should have been described as a normal table model.

The interior of Falk's new mobile showroom, designed to display a wide range of the company's products to various centres throughout the country. The products are shown in such a way that each can be quickly taken down for inspection. The new showroom is the largest of the Falk fleet, and the vehicle was designed specially for the purpose

TRADE PROSPECTS OVERSEAS

EGYPT ALTHOUGH there is no prospect of any substantial rise in British exports to Egypt, nevertheless, there are opportunities for a steady increase in certain categories of product, according to the report of the United Kingdom Trade Mission to the Egyptian Region of the Arab Republic, published last week. The report amplifies the Mission's preliminary report which was reviewed in our 28 April issue.

The seven-man mission was headed by Mr H. G. Nelson, managing director of English Electric, and industrial leader of the Government's Advisory Council on Middle East Trade.

In post-Suez Egypt the emphasis is on industrialisation and this trend is reflected in import policy, where priority is now given to capital equipment and raw materials. Imports of consumer goods have virtually ceased. In the electrical and engineering industries there are opportunities for British manufacturers to participate in major projects programmed under the second Five-Year Plan, in which £E100 million is earmarked for thermal and hydro-electric power stations and £E105 million for developments in the engineering, metal and mining industries.

Percentage shares of total imports into Egypt

Country	1955	1957	1959
United Kingdom ...	12·6	1·5	7·2
USA	11·7	8·9	13·9
USSR	1·2	10·2	12·1
W. Germany ...	10·2	9·9	13·0
Red China	0·1	3·9	3·7

Other new projects include railway improvements, involving the replacement of steam locomotives by diesels and electrification of signalling, and the expansion of telecommunications services, including radar and radio navigation systems for Alexandria harbour.

Foreign competition has increased considerably, the report points out, and since Suez many of our competitors are now firmly established. In particular, West German trade has increased. Egypt needs additional outside finance and the Egyptian Government prefers to know at the planning stage what credits they can rely on. Countries such as the UK, which make no definite offer of specific credit, may be at a disadvantage when contracts are placed.

Britain's percentage of total Egyptian imports compared with other countries in 1955 (the year before the Suez crisis), 1957 (the year following Suez) and 1959 are shown significantly in the table.

RUSSIA THE substantial increase in mutual trade between the UK and the USSR since the five-year agreement was signed in May last year was "noted with satisfaction" by British and Soviet delegations who met in London last week to work out measures aimed at further improvement of trade relations between the two countries. Heading the delegations were Mr F. J. Erroll, Minister of State, Board of Trade, and Mr P. N. Kumykin, Soviet Deputy Minister for Foreign Trade.

During the past year Soviet foreign trade organisations had placed substantial orders in the UK for machinery and equipment and exports of Russian goods to Britain had also increased. The range of goods had widened to some extent.

In the course of the negotiations the total amount of imports from each country into the other was fixed for consumer goods during the second year of the agreement, and the total value was agreed for imports into the UK of Soviet machinery, equipment and instruments. Further discussions on trade are to take place in the second half of 1960.

Entering Eire's Wholesale Trade

EIRE'S Fair Trade Commission has published new Fair Trading Rules relating to entry into the wholesale trade in domestic electrical goods. The Rules, which operate from 1 July, are aimed at securing freedom of entry to the wholesale trade and the avoidance of discrimination in the terms on which goods are supplied to traders.

The Rules also provide that the entry of a person to the wholesale trade in domestic electrical goods must not be conditional upon his belonging to any association or upon his application being sponsored or approved by any organisation or association.

Goods covered by these Rules are domestic and household electrical appliances (except lamp bulbs), ventilating, laundering, food preparation and refrigeration equipment.

A First for "Monarch"

THE GPO cable-laying ship, HMTS *Monarch*, is believed to be the first ship in the world to have h.f. transmitting equipment embodying a main amplifier in which there are no tuned circuits. The amplifier, installed by Marconi's Wireless Telegraph Co. Ltd. (who claim to be the only company in the world to be in full production with this type of equipment), provides a constant power gain over the band 1·5 to 24 Mc/s and therefore needs no retuning when the working frequency is changed.

H. & C. For Factories

FROM 1 Aug. next factory owners and occupiers in Britain will have to include running hot and cold or warm water among the washing facilities for workers under an order made by the Minister of Labour last week (21 June). The order (under Section 18 of the Factories Act) is additional to Section 42 of the Act, which requires that adequate washing facilities including soap and clean towels or other suitable means of cleaning or drying shall be provided and maintained.

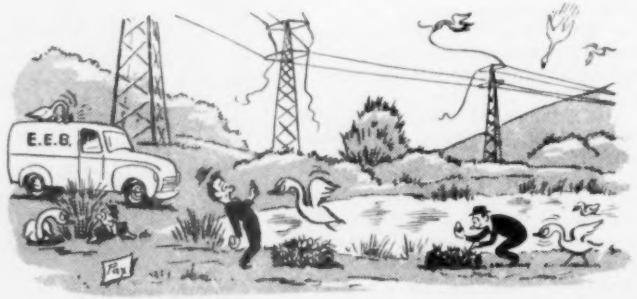
Factories employing five workers or less are, however, exempted from the order until 1 Aug., 1961. Also, district inspectors are empowered to grant exemptions for factories where suitable facilities are otherwise conveniently available or where the provision of a piped water supply or a drainage system or facilities for heating running water would not be reasonably practicable.

A draft regulation has also been issued to bring existing regulations concerning washing facilities into line with the new order.

SWAN SONG IN SUFFOLK . . .

One way of keeping wild swans in check and obviating damage to overhead power lines is to remove the eggs from their nests, it was suggested at a meeting of the General Purposes Committee of West Suffolk County Council recently. The council had been asked by Norfolk County Council to join them in an approach to the Home Secretary to have the mute swan removed from the list of protected birds, as there have been more than 100 swan faults to grid lines in the two counties in the past 18 months. The West Suffolk sub-area of the Eastern Electricity Board, while supporting the council's view, said there had been a decline in the number of swan incidents due to precautions they had taken. A council member suggested that if the swans succeeded in making the board put more of their lines underground "it would be a good thing."

. . . AND KITE MARKS IN CANADA



Metal-braced kites distributed by a petrol company in Canada as an advertising stunt are causing damage to overhead power lines and interruptions of supply in several parts of Ontario. Engineers called to investigate four major breakdowns are reported to have found kites entangled in the lines, but whether the kites were flown there accidentally or intentionally is not known

Serviceman's TV

— by Philco

DESIGNED with the service engineer in mind, Philco's new "Codenta" system of TV circuitry involves half a dozen or so basic units, which can be dismantled in less than five minutes. A colour-coding system distinguishes wiring and components employed in sound, vision, line, synchronising functions, etc. In addition to this, components are clearly marked so that the engineer knows exactly their function.

Basically, the new circuit design means that the servicer need no longer grope through a manual for clues to parts, but can at once locate the faulty component, remove it without the use of tools and replace it if he wishes to do so with a whole new assembly.

The first of the new sets, which so far cover six of Philco's range, will be available in limited numbers in July.

I.E.E. Conversazione

FOR the conversazione, which has become a biennial event for the Institution of Electrical Engineers, London's Festival Hall last week once more provided a convenient venue. The now-established programme for these occasions was repeated again, to the enjoyment of a large gathering of members of the institution and their guests.

Following a reception by the president and the president-elect (Sir Willis Jackson and Sir Hamish MacLaren), those attending had some 70 scientific and technical exhibits to interest them, covering the whole range of electrical engineering. Later in the evening there was dancing in the foyer of the Festival Hall and two concerts in the main auditorium, provided by the orchestra of the Corps of Royal Engineers and the Linden Singers.

Sayings OF THE WEEK

"Faith, hope and 50% are not going to answer our prayers. Individuals must read and think, and trade associations graft new activities on to existing ones and do some thoroughgoing market research." . . . MR N. STACEY (GEC), summing up the discussion on his paper on retailing at the ECA conference.

"If only there were as many residents of British extraction in Continental countries as there are of foreign extraction here our exports to Europe of domestic appliances and other consumer goods would go up by leaps and bounds." . . . S. A. M. MCEWAN, writing to the *Financial Times*.

"There is a danger that we are getting too clever with our testing, and consequently a tendency to design transformers for test, rather than service conditions." . . . MR F. W. GEE, at CIGRE.

PRICES of cable metals and other materials

Figures quoted are the official prices ruling on Tuesday, June 28

	£ per ton	Weekly change £
COPPER, standard class A (settlement)	256½	+½
" (3 months)	245½	−1½
LEAD, refined pig, 99·97% purity (cash)	70½	−2½
" (3 months)	72	−1½
TIN, refined, min. 99·75% purity (settlement)	800	+3
(3 months)	792½	+3
ALUMINIUM, ingots 99-99·5%	186	—
" wire bars (4 × 4 × 54")	193½	—
BRASS Strip 63/37	224	+4
SILVER (Troy oz)	79½d	—

	£ per ton	Weekly change £
ZINC, virgin, min. 98% purity (cash)	90½	+½
" (3 months)	89½	−½
RUBBER, per lb.		
No. 1, R.S.S. spot	37½d	−1½d
c.i.f. basis, ports, Sept.	34½d	−½d
ARMOURING:		
Galv. Steel Wire (0·104 in.)	66½	—
Mild Steel Tape (0·04 × 1½ in.)	53*	—
NICKEL (home)	600	—
MERCURY (76 lb flask)	70½	—
AMERICAN PRICES:		
Copper, electrolytic (per lb)	33c	—
Lead (New York)	12c	—

* *Tape Price, now on average, includes varnishing*

Fusebox Death: Firm fined £10

A LABOURER who was electrocuted while demolishing a building in Edinburgh last September had smashed a fusebox with a hammer and attempted to remove brass terminals with his hands, it was stated at Edinburgh Sheriff Court last week. The Capital Demolition and Construction Co., of Leith, pleaded guilty to failing to ensure that an electric cable liable to be a source of danger was not live, and were fined £10.

An Inspector of Factories told the court that the procedure in such demolitions was for the electricity board to cut off the electricity supply. "My information is that the firm did in fact make a telephone call to the board, and were told that the supply was, in fact, cut off, but that the board would send someone to make sure. When no-one appeared the firm assumed it was all right and carried on work."

He added that the electricity board denied all knowledge of the telephone call and there was no written confirmation. It was found that the supply to the building was cut off by the removal of three fuses from the fusebox, but the supply input to the brass terminals in the lower part of the fusebox was still there.

"There is no danger unless someone smashes the fusebox," the Inspector said. "I have discussed this with the board and I understand it is not their practice to cut off the supply if there is a chance of the premises being reopened."

At another site on which the firm was engaged, the same situation was found at the fusebox, although in that case a written assurance had been received from the board that the supply there had been cut off, we understand.

Imposing the fine, the Sheriff said: "Morally the firm have some excuse but they should have got it in writing. It is hardly good enough in matters of this kind, where there may be fatal accidents, to rely on telephone conversations."

£5,000 Reactor Order

A £5,000 order for two main reactor rod control boards for installation at Trawsfynydd nuclear power station has been placed with Lancashire Dynamo Nevelin, a company in the Metal Industries group, by Atomic Power Construction Ltd. The units will control the power supplies that lower and raise graphite rods into the reactors. Both boards will be delivered in 1962.

Light on Horticulture

NEARLY 200 Philips 400 W mercury-vapour lamps in special horticultural fittings have been installed in the research station of Fison's Fertilisers Ltd., at Levington, Suffolk. The installation, said to be the biggest of its kind using special horticultural lighting units, is in six glasshouses of the pot trials unit of the station and is designed to supplement normal daylight during winter by extending illumination to a period of 12 hours a day. The electrical load is 92 kVA distributed over a three-phase supply.

News in Brief

Mawdsley's Ltd. have received a large order for electrical equipment on the railway wagon marshalling system being installed by Strachan and Henshaw for Richard Thomas and Baldwins Ltd., at Llanwern.

Eire Electricity Supply Board have opened new showrooms at Fleet St, Dublin.

Over 5,000 Philips fluorescent lamps are being used in the new Canadian Pacific liner, the *Empress of Canada*.

The GEC annual sports and gala was held on 17 June at the company's sports ground in Wembley.

Battle RDC are to oppose routing through their district of the proposed o.h. line from Dungeness nuclear power station.

South of Scotland Electricity Board are shortly to receive a report on the use of helicopters for overhead line inspection, following some months of experiments.

A comprehensive range of Prestcold refrigeration service cabinets is to be installed in the new 26-storey Shell building now being erected on the South Bank, London.

Company Activities

NEVER does it rain but it pours! Not content with the howl from Hoover's, the fall off in sales of 'fridges, washing machines and furniture, in response to the end-April hire purchase measures, the depositing of £73 million "on ice" as "special deposits," and the successful stemming of Bank lending, Mr Amory has found it necessary to demand another £73 million from the banking system and to ban, up Bank Rate from 5% to 6%. This is a business man meaning business right enough!

Closing Prices of leading Electrical Ordinary shares before and after the 6% Bank Rate announcement

Company	Close June 22 Bank Rate 5%	Close June 23 Bank Rate 6%	Close June 24 Bank Rate 6%	Current Yield %
AEI £1	54/4½	52/10½	53/-	5·6
BICC £1	51/-	50/4½	50/6	5·3
Elliott-Auto. 5/- ...	25/9	24/9	24/6	1·9
GEC £1	36/6	35/9	35/4½	5·6
C. A. Parsons £1 ...	52/7½	51/7½	51/3	3·6
Reyrolle £1 "A" ...	39/9	39/-	39/3	4·5
BSR 5/-	50/3	49/4½	49/9	5·0
E. K. Cole 5/- ...	21/10½	20/10½	21/4½	4·7
Decca 10/-	48/6	47/10½	47/9	4·2
EMI 10/-	54/4½	49/6	50/3	2·8
Hoover 5/- "A" ...	41/6	38/3	40/-	5·6
Morphy-Richard 4/- ...	22/6	21/3	21/9	2·3
Philips Lamps fl. 10 ...	11/4⅜	12½	11⅛	1·3
J. F. Stone 5/- ...	27/4½	26/3	26/9	5·6
Thorn Elect. 5/- ...	49/6	46/-	47/9	2·1
Vactric 5/-	25/9	23/9	25/-	7·5
Financial Times Industrial Ord. Index ...	314·9	306·3	308·3	4·42

There can be little doubt now that the Chancellor takes a decidedly serious view of the Nation's failure so far in 1960 to push on above its present export plateau while imports have continued so disturbingly high. These latest measures clearly recognise that if stitches in time are not made now the country will find itself undone as far as the balance of payments is concerned in the Autumn when sterling comes under its greatest seasonal strain. We must suppose that by buttressing hire-purchase controls with dearer and scarcer credit the object of the exercise is to ease the pressure on imports both for raw materials and finished goods. A little odd, perhaps, that not very long ago there was such concentrated official effort to dismantle the remaining trade restrictions on imports. And with exports of other major trading nations now tending to shrink it remains to be seen whether British manufacturers will be able to counter an ailing home market for their products by selling more successfully abroad.

What now for stock markets? There was certainly no panic-collapse of prices following the announcement of the new measures. Marking down by jobbers and widening of quotations was only to be expected as a cautionary move against selling. In fact, now that the days of doubting, which began well before the Budget, can be considered substantially fulfilled, with H.P. controls, special deposits and a 6% Bank Rate to boot, the market may gauge that its yoke is not likely to be further weighed down and so find confidence to progress with more certain step.

My table (left) shows how electrical shares responded to this fresh twist of the thumb-screws. After the initial shock, prices generally were inclined to harden so that we are once more supplied with evidence that it is not always unwise to buy on "bad" news. Interest rates will now be moving up generally throughout the Economy and the fall in share prices takes cognisance of this fact. In the electrical equity market there is today plenty of scope for a current 5% income, as my table shows, and, come the prosperity of the years ahead, there is every prospect for price recovery, offering substantial capital appreciation.—*From our City Correspondent.*

Belliss and Morcom Ltd.

With a group loss of £144,990 for the year to 31 March last—against a profit of £89,287 last time—no final dividend is being paid. The interim was earlier cut to 3%. Last year's total was 8%.

Electric and General Investment Co.

Gross revenue for the year to 31 May is £140,961 (*£105,440*), and final dividend of 6½% makes the total 9½%. There is to be a rights issue of 100,000 £1 Ordinary shares at 40s each on a one-for-eight basis.

Electronic Trust

Gross revenue for the year to 31 May is £74,772 (*£69,355*) and after tax, etc., net revenue is £41,592 (*£38,509*). Dividend is 4% (*3½%*).

E. Elliott Ltd.

The golden jubilee of the foundation of this mouldings concern was celebrated with a record year's trading. Net profit, before tax, for the year to 31 March is £106,718 (*£36,312*), and dividend is raised to 15% (*12½%*).

Ferranti Ltd.

With record outputs from the electronic computer, power transformer and electricity meter departments, the group net profit after tax, for the year ended 31 March last, jumped to £2,123,390 from the previous year's figure of £1,104,572. Taxation charged is £1,854,000 (*£1,310,000*). The £2 million Ordinary shares privately held again get a 6% dividend.

Harper Engineering and Electronics

Trading profits for the year ending 30 June will not be less than £1,100,000 —against £251,900 in the previous year —Mr N. C. Weaver, the chairman, tells shareholders. A final of 40% is expected.

Heatrae Ltd.

Turnover reached a record figure in the past year and average monthly turnover is now approximately equivalent to the issue capital, Mr A. H. Freeman, the chairman, reports. New designs in both domestic and technical products will be available shortly and production floor space is being added to.

Year to 28 Feb.	£ Trading Profit	£ Net Profit	% on Ord.		Ord. Price	
			Earned	Paid	High	Low
1956	46,769	11,906	38	15	5/1	3/3
1957	46,194	14,161	46	15	5/-	4/-
1958	80,203	30,377	103	20	7/10	4/-
1959	49,446	15,156	47	20	10/3	7/6
1960	72,474	24,759	78	22½	11/6	8/7

Geo. W. King Ltd.

For 1959 the net profit after all charges, including tax, is £132,926 (*£105,346*). Dividend is maintained at 12½%, but on larger capital.

Marconi International Marine Communication Co.

It is proposed to issue 993,939 £1 shares, in capitalisation of reserves, on a two-for-three basis.

Pye Ltd.

For the year to 31 March last dividend is raised 2½% to 75% on the increased capital. Preliminary group profit expanded to £2,415,000 (*£1,704,000*) before tax.

Rediffusion Ltd.

With trading profit, etc., for the year to 31 March jumping to £6,464,866, dividend is raised 4% to 20%, tax free, on the larger capital, with a final of 12½%. Profit for the previous year was £4,675,255.

James Scott and Co. (Electrical Engineers)

A final dividend of 20% raises the total distribution to 25% on capital as increased by a one-for-ten scrip issue. In the previous year 24% was paid on the smaller capital. Consolidated profit for the year to 31 Jan. last is £356,420 (*£326,219*) and, after taxation, etc., net profit is £126,739 (*£119,791*).

John Thompson Ltd.

Orders booked during the six months ending 31 March last amounted to nearly £20 million—more than double those for the corresponding six months a year earlier. Orders on hand not invoiced for at the end of 1959 were valued at £29,430,000, and by the end of March had risen to £31,370,000.

Dividend Declared

Hawker Siddeley Group. Interim 5%.

COMMERCIAL INFORMATION

Contracts Open at Home . . .

Dates given are the final for receipt of tenders unless otherwise stated.

30 June—Belfast C.C. Applications invited for inclusion in select list for the supply and installation of passenger lifts in two 13-storey tower blocks of flats at North Queen St. Applications by 12 noon on above date to Town Clerk, J. Dunlop, City Hall.—See 16 June issue.

30 June—Breconshire C.C. Electrical installation sub-contract (No. 12) in erection of new council chamber.—See 16 June issue.

30 June—Cardiff C.C. Contract 5: Erection of 100 Class "A," 600 Class "B" concrete columns and complete installation of fluorescent and sodium lanterns, etc.—See 16 June issue.

30 June—East Riding C.C. Electrical services installation at Beverley county garage. —See 23 June issue.

30 June—Edinburgh T.C. Supply of three pumps, each of 250 g.p.m. at a 160 ft head capacity along with ancillary electrical equipment, sluice valves, etc., for installation at Fairmilehead.—See 16 June issue.

30 June—Kettering B.C. Provision of 81 400 W and 59 250 W m.v. units on steel columns; contracts as follows: (a) supply of lanterns/auxiliary gear/lamps; (b) supply and erection of columns with wiring/fitting of electrical equipment supplied by another firm; (c) whole work.—See 9 June issue.

30 June—Llanelly B.C. Laying and excavating of 750 yds of cable for mains connection of 245 street lighting units.—See 23 June issue.

30 June—Middlesbrough C.C. Stripping of existing wiring and rewiring 24 fittings plus installation of six new fluorescent fittings at Dacre St Baths.—See 23 June issue.

30 June—N. Ireland Hsg. Trust. Electrical installations in 46 dwellings in Rathcoole 8c (extension).—See 16 June issue.

30 June—Offaly C.C. Electrical installation in connection with alterations and reconstruction work at County Hospital, Tullamore.—See 23 June issue.

30 June—West Lothian C.C. Separate trades tender electrical work in erection of 18 houses at Greenrigg, Harthill.—See 23 June issue.

1 July—Manchester C.C. Electrical installation in day nursery at Daisy Bank Rd, Victoria Pk.—See 23 June issue.

1 July—Peterborough T.C. Lighting and power installations in 34 dwellings on Gunthorpe Estate and four Keeton Rd dwellings. City Engineer, Town Hall.

2 July—Dagenham B.C. Wiring by contractors on N.I.C.E.I.C. roll for lighting and power in 190 dwellings, Canvey Island Development, Contract 4.—See 23 June issue.

2 July—Llangollen U.D.C. Electrical installations in 20 houses at Maes Pengwern.—See 23 June issue.

2 July—Margate B.C. Erection and internal wiring of 520 lighting columns with fluorescent and sodium lanterns complete.—See 23 June issue.

4 July—Cookstown R.D.C. Electrical installations in Stewartstown and Blackhill housing schemes. Details from W. and M. Given, Molesworth St, Cookstown.

4 July—Hillsborough R.D.C. (a) Electrical installation in new offices.—See 9 June issue.

4 July—King's Lynn B.C. Dismantling of existing tungsten lighting and erection of tubular steel columns, wall brackets; fixing and wiring of lanterns, lamps and control gear for: (a) Group "A" 25 ft, 400 W mercury colour corrected lighting; (b) Group "B" 15 ft, 125 W mercury and 45 W sodium vapour lighting.—See 16 June issue.

4 July—Sevenoaks R.D.C. Electrical and improved lighting installations in Council Offices. Engineer and Surveyor, Inglewood, Oak Hill Rd. Deposit £1 1s.

5 July—Armagh C.C. Electrical installation in Richmount new three-roomed school.—See 16 June issue.

5 July—Bradford. Electrical work in office block, warehouse and glass dept. for Rycroft and Co. Ltd.—See 9 June issue.

5 July—Consett U.D.C. Supply and erection of (a) 10 m.v. and (b) 56 sodium lanterns, poles, etc., for A692 and B6322 lighting.—See 23 June issue.

5 July—Maidstone B.C. Provision and fixing of additional lighting fittings at Museum and Art Gallery. Borough Eng., Palace Ave.

5 July—Manchester C.C. Erection of 300 25 ft concrete street lighting columns in Kingsway, Slade La and Altrincham Rd. City Surveyor, Town Hall, Manchester 2.

5 July—Newcastle-on-Tyne C.C. Supply and installation of lightning protection equipment to 13 blocks of 15-storey flats.—See 23 June issue.

6 July—Durham C.C. Electrical installation in new Brancepeth Nursery School. Applications to County Architect, South St, Durham, by above date.

6 July—Kingston upon Hull C.C. Lighting and power installations at Rokeby Pk County Primary School. Details available on the deposit of £2 with City Treasurer.

6 July—Leeds Hospital Board. Electrical installation in Hull Mass Radiography Unit, Baker St. Applications to Board Architect, Park Parade, Harrogate, by above date. Deposit £2 2s payable to Regional Hospital Board.

6 July—Renfrew C.C. (6) Electrical installation in the erection of two four-apartment dwellings at Newton Mearns Sewage Works. County Engineer, 16 Back Sneddon St, Paisley.

7 July—Hastings C.B. Electrical installation in St. Paul's Primary School, Horntye Rd, St. Leonards.—Advertised 23 June issue.

8 July—Bridlington. Electrical installation in Manor Convalescent Home, 60 South Marine Drive. General Secretary, Leeds and District Workpeople's Hospital Fund, 41 Paul's St, Leeds 1.

8 July—Brighton. First stage: Electrical installation on fixed-price basis in Brighton, Hove and Sussex Grammar School for Joint Education Committee.—See 23 June issue.

8 July—Darlington R.D.C. Supply and erection complete of three recirculation pump sets with electric motors automatically controlled, two of 1,200 g.p.m. each at a 28 ft head and one of 100 g.p.m. against a 20 ft head.—See 16 June issue.

8 July—Co. Derry. Electrical installation in new voluntary secondary intermediate school for Rev. P. Dillon.—See 16 June issue.

8 July—Lichfield C.C. Supply, erection and installation of 27 steel columns with sodium lanterns and ancillary equipment.—Advertised 23 June issue.

9 July—Bridgwater B.C. Supply and erection of 200 sodium and mercury/fluorescent lamps on 15 ft prestressed concrete columns plus the conversion of 50 tungsten units to mercury/fluorescent; contract includes the supply and jointing of underground cables. —See 2 June issue.

11 July—Coseley U.D.C. Erection of 195 Group "B" lighting units on concrete columns with the probability of a further 39 Group "B" and 20 Group "A" units.—See 23 June issue.

11 July—Hereford T.C. Wiring installations in 105 houses on Redhill estate, section four; 62 houses on Newton Farm estate, section four; 102 houses and 10 bungalows on Redhill estate, section five. City Architect, Town Hall. Deposit £1 1s each group. —Advertised in this issue.

11 July—New Mills U.D.C. Erection of 11 street lighting points included in roadworks in Bakehurst estate extensions. Surveyor, Town Hall, New Mills, near Stockport.

11 July—West Riding C.C. Supply and erection of eight 200 W sodium vapour lighting on steel columns complete with lanterns, lamps and gear for A630/Doncaster By Pass Motorway junction at Warmsworth. City Engineer and Surveyor, County Hall, Wakefield.

12 July—Ormskirk U.D.C. Provision of additional power points plus renewal of switchgear and lighting circuits in 77 houses. —Advertised 23 June issue.

12 July—Queensbury and Shelf U.D.C. Separate trade tender electrical work in erection of a pavilion, Shelf Hall Pk.—See 16 June issue.

12 July—Southport C.B. (1) Electrical installation sub-contract in proposed Occupation and Industrial Centre, Sandbrook Rd, Ainsdale.—See 9 June issue.

13 July—Hertford B.C. Applications invited for inclusion in select list of contractors for erection, columns, lanterns and equipment for (a) 300 400 W mercury fluorescent

Your Queries Answered

Readers are invited to make use of our free enquiry department which possesses wide resources, including an index of trade information with over 100,000 entries

A Selection from the 108 queries answered this week

"Proscon" thermostats—makers of? G.E.—Process Control Gear Ltd., Lattimore Rd, St. Albans, Herts.

"Hyflo" float switches—makers of? E.D.A.—A. Kingsley Williams, Victory Wks, 9 Newbold Rd, Chesterfield.

"Tempo" pressure cookers—address for? D.S.I.—Tempo Aluminium Ltd., Dominion Wks, Gt. Brickiln St, Wolverhampton, Staffs.

"Moreton" glass washing machines—makers of? A.B.—The Moreton Engineering Co. Ltd., Burnley Rd, Moreton-in-Wirral, Ches.

"Rowenta" irons—agents for? S.E.E.B.—Rowyn Ltd., 216 Kensington High St, W.8.

Nylon strain relief bushings—makers of? T.E.—Injection Moulders Ltd., Westmoreland Rd, N.W.9.

"Kingsway" vacuum cleaners—suppliers of? P.E.—Kingsway Electrical Appliances Ltd., 3 Crouch End Hill, N.8.

"Alpine" refrigerators—address for? P.S.—Domestic Refrigerator Co., Alfred St, Werneth, Oldham, Lancs.

"Lexlite" fluorescent inspection lamp—suppliers of? C.R.—Lexington Products Ltd., 3 Alfred Pl, W.C.1.

units; (b) 268 200 and 140 W sodium units; (c) 203 60 W sodium units; and (d) 338 100 W tungsten units on existing gas columns.—Advertised 23 June issue.

14 July—Beverley R.D.C. Contract Two. Supply and erection of three 300 cubic ft per min. unscreened sewage pumps complete with motors, starters and accessories. Details from consulting engineers, J. H. Haiste and Partners, Belmont Hall, 20 Wood La, Headingley, Leeds 6. Deposit £3 3s payable to R.D.C.

14 July—Sunderland C.B. Electrical installations: in 138 dwellings; in Plains Farm Junior School for water heating services; in Bede Grammar School's kitchen dining room block. Borough Architect, Grange Hse, Stockton Rd.

14 July—Sunderland T.C. Electrical installation in £16,000 community centre at Monkwearmouth.—See 23 June issue.

15 July—Callander T.C. Supply, erection and putting into service of 10 steel columns with 140 W sodium lanterns and auxiliary equipment for A81 lighting.—See 23 June issue.

15 July—Croydon C.B. Electrical installation in Whitehorse Manor School, Whitehorse Rd. Borough Engineer, Town Hall.

15 July—Kesteven C.C. Supply and erection of 15 steel lighting columns at A1 Gonerby Moor roundabout. County Surveyor, County Offices, Sleaford.

18 July—Irwell Valley Water Board. Supply and erection of automatic electric pumping plant, Whitfield, to deal with constant 2 m.g.d. flow.—See 2 June issue.

18 July—Morley B.C. Supply, installation and putting into service of 36 totally enclosed 140 W sodium street lighting units on 25 ft concrete columns. Public Lighting Engineer, Town Hall.—Advertised in this issue.

18 July—Scnlby U.D.C. (a) Supply and erection of 34 colour corrected m.v. 125 W lamps and 11 80 W for Group "B" lighting; (b) supply of lanterns, time switches, lamps and ancillary equipment; (c) supply, erection and painting of 15 and 18 ft steel columns complete with brackets; (d) installation and wiring (b) equipment, for Coldyhill Lane, Newlands Pk Drive, Cleveland Ave and Weydale Ave. Newby lighting. Surveyor, G. Horn, Council Offices. Deposit £2 2s.

22 July—Reading C.B. Supply and installation of cables, switchgear, fittings and accessories for distribution, control and site lighting for new Manor Farm Sewage Disposal Works, which is under construction.—See 9 June issue.

25 July—Forehoe and Henstead R.D.C. (c) Electrical installation in Central Depot, Ketteringham.—See 23 June issue.

26 July—Ilford B.C. (a) Erection and connection of 1,000 columns; (b) cable laying, jointing and trenching; (c) thrust boring for Stage III of Group "B" street lighting.—Advertised 23 June issue.

28 July—Omagh. Electrical installation in new Crown Bldg, Mountjoy Rd, for M. of Finance. Details from Room 103, Law Courts Bldg, Belfast 1.

29 July—Brighton C.B. Supply, erection and maintenance of three electrically driven submersible well pumps and four booster pumps with control gear, etc.—See 16 June issue.

30 July—Bridport B.C. Supply and erection of 26 Stewarts and Lloyds tubular steel fluted columns and 125 W m.v. lamps for Group "B" lighting at North Allington. Borough Engineer, Municipal Offices, South St, Deposit £2 2s.

13 Sept.—Cardiff C.C. Supply and erection of pumps, motors, switchgear, screens and other electrical and mechanical plant for complete pumping stations at Usk and Pontypool, contract B.2 of Llandegfedd scheme.—See 16 June issue.

No date stated—Ayr C.C. (1) Supply of concrete columns: (2) supply of electrical equipment; (3) erection; (4) supply of lanterns for 140 W SO/H lamps for Ballantrae A77 street lighting.—See 16 June issue.

No date stated—Berks C.C. Supply and erection of 28 35 ft steel columns, lanterns and other work for Oxford Southern and Western By-pass scheme, Botley and Woodstock Rd roundabouts. County Surveyor, Shire Hall, Reading. Deposit £2.—Advertised in this issue.

No date stated—Fishguard and Goodwick U.D.C. Provision, erection and wiring of 19 140 W sodium lanterns on 25 ft steel columns and 33 brackets on existing wooden poles for A40 street lighting.—See 23 June issue.

No date stated—Scotland. Supply of 1-200 kW 440 volt motor-driven induction heating generator, complete with condenser cubicle and all associated switchgear.—See 2 June issue.

No date stated—Taf Fechan Water Supply Board. Conversion to a.c. of treatment works at Pontsticill, near Merthyr Tydfil, including: (1) goods lift; (2) supply of pumps; (3) supply of air compressors; (4) supply of 415 V switchboard including 150 A c.b.; (5) supply of 250 yd cable; (6) supply of small geared motor units; (7) supply and installation of one 50 kW water turbine alternator set complete with switchboard; (8) supply and installation of cables, etc., for rewiring and wiring of new equipment by contractors on N.I.C.E.I.C. Roll.—Advertised 16 June issue.

CONTRACTS PLACED

C.E.G.B. Contracts placed during the past month amounting in the aggregate to approximately £3,619,000 include: Trawsfynydd nuclear power station, civil works at 275 kV substation, The Yorkshire Hennebique Contracting Co. Ltd. Rheidol hydro-electric power station, northern aqueducts, G. Dew & Co. Ltd. Thorpe Marsh power station, two 120 MVA, 275 kV inter-bus transformers, Nos. 1 and 2, and two earthing transformers, Ferranti Ltd. Uskmouth B power station, main lighting, heating and socket-outlet installation, London Electricity Board. Aberthaw power station, one 120 MVA generator transformer No. 4, Fuller Electric Ltd. Leatherhead high voltage laboratory, main civil engineering works, M. J. Gleeson (Contractors) Ltd. West Thurrock power station, booster pumps, and starting and standby boiler feed pumps, Sulzer Bros. (London) Ltd. Kingston substation, four 45 MVA, 132/33 kV transformers, Hackbridge and Hewittic Electric Co. Ltd. Iver substation, two 40 MVA synchronous condensers and exciters, Associated Electrical Industries Ltd. Lydd substation, 275 kV switchgear, A. Reyrolle & Co. Ltd.

Carlisle T.C. Supply and installation of lift at new civic centre, Express Lift Co. Ltd., £30,855. Erection of 29 Class "A" and 57 Class "B" columns on Morton housing estate, B. L. Oliver, £2,892.

Newcastle upon Tyne C.C. Supply of lamps: g.l.s. and fluorescent, Luxram Electric Ltd., £4,174; automobile, Maxim Lamp Works Ltd., £712; discharge, C.W.S. Ltd., £4,712.

Stockton-on-Tees T.C. Electrical work at Roseworth Secondary Modern School, Rose & Co., £1,104 15s.

TRADE NOTES

Change of Address. Suflex Ltd. have moved to Bilton House, 54-58 Uxbridge Rd, Ealing, W.5. Telephone: Ealing 7733.

Change of Name. Edmundsons Construction Co. Ltd. have changed their name to K. S. Construction Co. Ltd., and the business continues to be carried on from the head office at 24-30 Gillingham Street, S.W.1, and branch office at 2 Hartley Hill, Leeds.

Iceland's Imports. Under a new Act, Iceland has made important changes in its import and currency regulations. There are now two main lists of imports. List A, being goods which are liberalised and not subject to licence but for which the importer must make payment arrangements before shipment, includes lifts, turbines, dynamos, transformers, rectifiers, batteries, resistances, electrical installation goods, doorbells, switches and plugs. List B goods, still needing import licence, include lampshades, electric motors, accumulators, cables and bulbs.

. . . and Overseas

*Details of items marked * may be obtained on application to the Board of Trade, Lacon Hse, Theobalds Rd, W.C.1, quoting reference.*

6 July—Rhodesia and Nyasaland. Overhead line h.t. and l.t. insulators, clamps, hardware and l.v. pole-mounted cable boxes. Town Clerk, P.O. Box 591, Bulawayo. B.o.T. (ESB/16552/60).*

7 July—Pakistan. 30 broad gauge and 21 metre gauge diesel-electric locomotives. Secretary, Railway Board, Room 342, Tughlaq Hse, Shahrah Kamal Ataturk, Karachi. B.o.T. (ESB/16240/60).*

7 July—Pakistan. 400 vertical turbine pumps with electric motors with capacities of from 2 to 4·5 cusecs at 50 to 80 ft heads. West Pakistan Water and Power Development Authority, The Pipals, Lower Mall, Lahore. B.o.T. (ESB/16243/60DLF).*

11 July—Burma. Supplies lists include starters, condensers, conduit fittings and wire—closing date 12 July—Chatterton compound. Director-General, Union of Burma Purchase Board, St. John's Rd, Rangoon. B.o.T. (ESB/16579/78/80/83/60).*

14 July—Thailand. Two 600 kVA, oil-immersed, self-cooled transformers. Commercial Dept., Metropolitan Electricity Authority, 121 Chakraphet Rd, Bangkok. B.o.T. (ESB/15650/60/DLF).*

22 July—New Zealand. 3,000 yd 4-core 0·075 non-draining l.t. cable and 2,000 yd 2-core 0·0145 l.t. cable. Chairman, Auckland Electric Power Board, Queen St, Auckland C.1. B.o.T. (ESB/16597/60).*

22 July—S. Africa. 4,550 lb winding wire in various sizes. Secretary, Union Tender Board, 291 Bosman St, Pretoria. B.o.T. (ESB/16554/60).*

30 July—Nigeria. Two 1 MW mobile diesel alternator sets. Resident Engr., E.C. of Nigeria, Adelphi, John Adam St, W.C.2.

8 Aug.—India. 11, 33 and 132 kV transformers and switchgear for three substations. Superintending Engineer, S. N. Singh, Rihand H.E. Design Directorate, 10/489 Allenganj, Kanpur. B.o.T. (ESB/16211/60).*

8 Aug.—New Zealand. Six resistance banks to discharge 200 A in 5 A steps. Director-General (Stores Division), G.P.O., Wellington. B.o.T. (ESB/16587/60).*

8 Aug.—Pakistan. Sewage pumping plant and generating sets for Clifton Pump Station. Director-General of Supply and Development, Frere Rd, Karachi. B.o.T. (ESB/16238/60).*

9 Aug.—Egypt. 3 ph. diesel generating sets (a) 150/185 kVA; (b) 185/235 kVA. Ports and Lighthouses Administration, Arsenal Gate No. 1, Alexandria. B.o.T. (ESB/15967/60).*

9 Aug.—India. 10 miles of 132 kV single circuit transmission line on double circuit towers between Mughalsaai and Varanasi. Superintending Engineer, S. N. Singh, Rihand H.E. Design Directorate, 10/489 Allenganj, Kanpur. B.o.T. (ESB/16212/60).*

9 Aug.—India. Hot line tools and accessories for e.h.t. lines for Andhra Pradesh State Electricity Board. Details, fee 7s 2d, from Co-ordination Branch, India Store Dept., Bromyard Ave, W.3. Tender inquiry S.E.195, viewing reference S.3133/60/NSC/ENG.2.

BUSINESS PROSPECTS

Aberdeen. 552 Hazlehead houses planned.

Abergavenny. Cooper's Mechanical Joints, Llanfoist Wks, Abergavenny, plan factory and office block.

Aberystwyth B.C. Tender: Reconstruction and additions to Town Hall. Architect, S. C. Foulkes, Merton Pl, Colwyn Bay.

Bacup. Irwell St centre for the blind planned.

Belfast. Clearent Engineering Co., 24 Ormeau Ave, plan £25,000 factory.

Billingham-on-Tees. Wimpey & Co., Fenwick Ter, Newcastle, contractors for £72,000 five-storey block of flats for U.D.C.—Tender: 63 Roseberry Rd houses. Engineer and Surveyor.

Bingley U.D.C. Tender: 36 Poplar Hse, Bradford Rd, flats. Surveyor.

Birmingham. Following plan industrial developments: L. and O. Hamnet, 81 New John St; James Cummow, Barford St.—W. G. Howell, of Howell Killick and Partridge, 82 South Hill Pk, London N.W.3, architect for new University of Birmingham building for Faculty of Commerce.—W. J. Whittall and Son, 132 Lancaster St, plan Lawson St multi-storey car park and offices.—T.C. Tender: 14 Woodcock La, Northfield, dwellings. City Architect.

Bootle. Stephenson, Young and Ptnrs, 6 Bluecoat Chmbrs, Liverpool 1, architects for James Sullivan and Co. laundry extensions.

Bridport. W. G. Taylor and Sons, 104 Bargates, Christchurch, Hants, contractors for £40,763 upgrading of Port Bredy Hospital for Wessex Hospital Board.

Bristol. Lucas, Roberts and Brown, Barnfield Rd, Exeter, architects for Serck Radiator Services factory, Brislington estate.

Bromborough. Holland and Hannen and Cubitts (North-West), New Chester Rd, contractors for £1 million British Extracting Co. compound mill.

Burnley. NWEB, Cheetwood Rd, Manchester 8, plan Hind St amenity block.

Carlisle. E. M. Lawson, Barras Bldgs, architect for Border Television, TV centre.

Co. Clare. Tender: Shannon Free Airport Dev. Co. 138 flats, 108 flats and 30 flats. Dermod J. O'Brien, 87 O'Connell St, Limerick, quantity surveyor.

Cosley U.D.C. 52 Meadow La houses, two and three storeys. Clerk.

Cwmamman U.D.C. Tender: 20 one-bedroom dwellings, Half-moon site. Architect.

Dagenham. Lewis Berger (Gt. Britain), Freshwater Rd, plan extensions.

Dawley. Ever-Ready Co., Hinkshay, plan factory extensions.

Derbyshire. Naylor, Sale and Widdows, St. Mary's Gate, Derby, architects for Pastures Hospital, Mickleover, nurses' school.

Doncaster. National Council of YMCA, Gt. Russell St, W.C.1, plan £120,000 new headquarters, Wood St.—T.C. Health centre planned.

Dorchester. Wessex Regional Hospital Board plan upgrading Herrison Hospital.

Downpatrick. N. Ireland Housing Trust tender: 40 dwellings. Trust offices, 12 Hope St, Belfast 12.

Droylsden U.D.C. Tender: 12 Greenside La houses. Architect, Frank Bradley, Penny Bank Chmbrs, 4 Wood St, Bolton.

Edenbridge. Frank Bilton (London), 33 Streatham Pl, S.W.2, contractors for £72,185 LCC factory.

Edinburgh. Robert Matthew and Johnson-Marshall, 31 Regent Terr, architect for £1 million faculty buildings, George Sq, for the University.—T.C. Tender: 18 houses, Oxgangs farm site. Architect.—Tender: Royal Infirmary, alterations at radio diagnostic dept. Secretary.

Enfield. E. W. Palmer and Ptnrs, 8 The Town, architects for Tobe Pain Co. exten.

Essex C.C. £64,550 Bevan Ave, Barking, home planned by Welfare Committee.

Eston U.D.C. Tender: 204 Church La estate dwelling houses. Engineer, N. C. Harrison, 246 Normanby Rd, Middlesbrough.

Fife C.C. Tender: Torbain Infants' School, Kirkcaldy. County Clerk.

Flint B.C. Tender: 87 Pen Goch dwellings. Borough Engineer.

Folkestone. F. W. Maul and Sons, 78 Tontine St, plan Tile Kiln Rd plastics moulding factory.

Glasgow. Extensions planned to Clydesdale Chemical Co., 105 Millerston St, and to wallboard factory at Gyproc Ltd., Shieldhall, Glasgow S.W.1.—Keppie, Henderson and Co., architects for Thomson and Brown Bros. warehouse, Bath La.—Turners Asbestos Cement Co., Trafford Pk, Manchester 17, plan £500,000 Dalmuir factory extension.

Grimsby T.C. Taylor and Coulbeck, Cleethorpes, contractors for £267,000 Scarthoe Rd swimming baths.

Guildford. J. B. Markes and Ptnrs, 106 High St, quantity surveyors for £30,000 Palmer and Harvey warehouse/offices.

Harlow. AEI, 33 Grosvenor Pl, S.W.1, plan Easter Industrial Estate premises, own architects.

Hemel Hempstead. Wallis, Gilbert and Ptnrs, 5 Cromwell Rd, S.W.7, architects for Hemel Hempstead Eng. Co.'s extensions.

Huddersfield. New geriatric ward planned for St. John's by Leeds Hospital Board.

Hull. Arthur Lazenby, 101 Spring Bank, architect for Boothferry Rd clinic.—Town Centre Securities to develop Prospect St land.

Hunts C.C. F. B. Thackray and Co., Huntingdon, contractors for £35,946 secondary modern school completion.

Inverness-shire. J. L. Gleave, 21 Woodside Pl, Glasgow C.3, architect for new Fort William hospital.

Isle of Ely C.C. H. E. Edgley, Chatteris, Cambs, contractor for £10,184 extensions to Coveney V.P. School.

Kesteven C.C. £100,000 modernisation scheme for Kesteven Farm Institute, Caythorpe Court.

Leicester T.C. Tender: Extensions to Art and Technology College. Architect.

Leics C.C. £34,310 Loughborough Training College hostel planned. Architect.

Lindsey C.C. Conversion of Scawby Gove, Brigg, to children's centre (£19,000) planned. County architect.

Liverpool T.C. Tender: 64 Higher La dwellings, 18 St. James St flats, three Greenlake Rd flats, four Chapman St houses, 64 dwellings, eight shops, Furlong St. Architect.

London. Denhams (Norwich), All Saints Rd, W.3, plan Stirling Rd, Acton, factory.—W. R. Craig and Co., 32 Palmerston Rd, W.3, plan Bollo La industrial building.—J. T. Luton and Son, 14 Forest La, E.15, contractors for W. Phillips and Co. (Preserves) factory, Gurney Rd, E.15.—Kilby and Gayford, 87 Worship St, E.C.2, contractors for £50,000 Dallington Fields, E.C.1, premises for Lumos and Co.—E. C. Harris and Ptnrs, Lynton Hse, Tavistock Sq, W.C.1, quantity surveyors for CEGB Squires La offices, N.3.—Stock, Page and Stock, 3 Fanshaw St, N.1, architects for four-storey Brunswick Pl factory.—J. Day and Co. (Derby Wks), Harrow Manor Way, S.E.2, plan Woolwich premises at Abbey estate.—St. Giles Hospital nurses' school and clinic planned.—W. C. Inman and Ptnrs, 7 New Sq, Lincoln's Inn, W.C.2, quantity surveyors for £100,000 Froebel Educational Institute, Roehampton La, phase 2.—Troup and Steel, 14 Gray's Inn Sq, W.C.1, architects for King's College, Strand, extensions.—R. Seifert and Ptnrs, 28 Gt. Ormond St, W.C.1, architects for nine-storey Fleet St building.—Prudential Assurance Co., Holborn Bars, E.C.1, plan Fleet St area development.—Aslan and Freeman, 8 Oxenden St, S.W.1, architect for Old St and Cowper St shop/offices/bank premises.—Carl Fisher and Assoc., 56 Portland Pl, W.1, architects for J. Henry and Co.'s Goswell Rd premises.—Norman, Preston and Ptnrs, 83 Kingsway, architects for offices/storage buildings at Lewis Grove, S.E.13.—J. Stanley Beard, Bennett and Wilkins, 101 Baker St, W.1, architects for National Cash Register Co.'s new premises, Marylebone Rd, N.W.1.—C. E. Ball and Ptnrs, 36 Fitzroy Sq, W.1, quantity surveyors for Vauxhall Bridge Rd flats and offices.—Wester Margarine Ltd. plan additions to Westfield Rd factory.—G.R.M. Heat Treatments Ltd. plan Coronation Rd factory extensions.—City Wall Properties Ltd. plan multi-storey Brompton Rd, S.W.1, block, shops, showrooms, offices and flats.

Louth R.D.C. 11 old people's dwellings, North Thoresby, planned. Surveyor.

Lowestoft. Yarecroft Marine plan factory.

Maidstone. Holgate Securities plan business building, 140 Wheeler St.

Manchester. R.C. authorities plan Harpurhey secondary school.—Commercial Holdings, 36 Wigmore St, London W.1, plan seven-storey showroom/office block, Pink/York St.—Grove and Whitnalls, Regent Rd, plan Northenden hotel.

Marlborough. Garrard Engineering Co., Elcot La, plan factory extensions.

Merthyr Tydfil B.C. Tender: Stage 11 of omnibus garage, 24,000 sq ft. Clerk.

Middlesbrough. Teesdale Wholesale Meat Co. plan Snowdon Rd slaughterhouse.—Newcastle Hospital plan cobalt unit, North Ormesby Hospital. Board's own architect.—Board plan dept. of physical medicine and General Hospital.—61 flats and flatlets planned Grassington Rd, Borough Engineer.

Morley B.C. Tender: 28 Gildersome bungalows. Engineer.

Newcastle. Thomson Newspapers, Thomson Hse, Gray's Inn Rd, W.C.1, plan rebuilding of their offices and premises.—T.C. Tender: 92 maisonnettes in four-storey blocks, 57 houses, Walker Rd. City Architect.—£485,000 Saville Row/Higham Pl library centre planned. City Architect.—T.C. 92 maisonnettes, 57 houses, and garages planned, Walker Rd. City Architect. T.C. Tender: 114 Newbiggin Hall Estate Houses. Architect.

Northumberland C.C. Education Com. plan Hexham grammar school. Architect.

Nottingham. Reginald W. Cooper, Russel Hse, Talbot St, architect for 10-storey shop/office block (£400,000) for Westminster Construction Co. at Granby St.

Nuneaton. Union Wool and Leather Co., Church St, plan factory extensions.

Paisley. Pressed Steel Co., Cowley, Oxford, plan 260,000 sq ft works extensions.

Peterlee. D. Brown, 10 Lambton Rd, Jesmond, Newcastle, architect for Westway Junior R.C. School.

Portadown. Mayfair Manufacturing Co., 57 Effra Rd, S.W.2, plan 45,000 sq ft extensions to Mill Ave factory.

Portsmouth. Bettix plan Rodney Rd factory extensions.—J. H. Sparshatt and Sons, London Rd, Hilsea, plan Fitzherbert Rd factory.—S.E.B. Ltd. plan Western Rd factory extensions.

Reigate B.C. Tender: 26 Dome Estate maisonnettes, Redhill. Surveyor.

South Shields T.C. Whitelas Infants' School planned. Architect, J. Smeds, 65a Camden St.

Stockton-on-Tees. E. W. Chapman, 125 Acklam Rd, Thornaby-on-Tees, architect for new Thornaby hospital operating theatre.—T.C. has loan sanction for £121,220 street lighting cost.

Stratton. Stratton Cottage Hospital outpatients' dept. planned.

Sunderland. Dowsett Engineering Construction, Dowsett Hse, Durham Rd, Low Fell, Gateshead, contractors for Slater St factory for Webster and Co.

Tynemouth. 147 Girton Grange East houses and eight flats planned. Borough Engineer.

Business Prospects—Continued

Wakefield. Williams and Womersley, architects for Hepburn Conveyor Co., Ings Rd, factory extensions.

Walsall. L. Dainty, Leighswood Grove, Aldridge, contractors for Whitehouse Cox and Co. factory extensions, March St.

Wandsworth B.C. Tender: 23 Streatham High Rd flats. Town Clerk.

Warwick B.C. Tender: 13 bungalows, 14 houses, East End clearance. Engineer.

Wellington. Salop C.C. plan Whitchurch Rd school.

Wembley. Fuller Hall and Foulsham, 212 High Holborn, W.C.2, architects for Ealing/Norwick Rd office block.

Whitley Bay. Rosspark (Links) plan £500,000 flats/bus station/restaurant site.

Wokingham. Radio Heaters, Eastheath Ave, plan multi-storey office block, Mollie Millars La.

Worthing. Boys' high school planned, Bolsover Rd.—Part of C.C.'s education scheme are: £151,008 St. Andrew's School; £27,951 four-class instalment of St. Thomas à Becket School: £40,000 school for backward children: £60,000 extensions to Rydon school and £50,820 junior school.

W. Kesteven R.D.C. Tender: Small booster station, Wilsford Heath, for water supply. Consulting Engineers.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons Ltd., 116 Chancery La, W.C.2.

Anderson Electrix Washer Co. Ltd., 34 Daisy Hill, Dewsbury. Nom. cap.: £1,000. Dir.: Mrs Mavis Anderson.

F. H. Baines Ltd., 133 Southdown Rd, Harpenden, Herts. To take over business of an electrical contractor carried on at Harpenden as "F. H. Baines," etc. Nom. cap.: £2,000. Dirs.: Francis H. Baines and Evelyn Baines.

Cowlishaws (Eastwood) Ltd., 203 Nottingham Rd, Hill Top, Eastwood, Notts. To carry on business of electrical engineers, etc. Nom. cap.: £2,000. Dirs.: John J. Cowlishaw, Stanley Brookes and Harry Godfrey.

Gidley (Machinery) Ltd., Longford Bridge, Stretford, Manchester. Mechanical and electrical engineers, etc. Nom. cap.: £100. Dirs.: Roland Gidley and Hilda M. Gidley.

Halpins (Dishtron) Ltd., 71 London Rd, Southampton. Manufacture, sale and exploitation of all types of electrically and electronically operated domestic equipment and machinery. Nom. cap.: £100. Dirs.: Bennett G. Halpin and Miss Constance M. Halpin.

A. W. Harris Ltd., 299 West Wharf Rd, East Dock, Cardiff. Mechanical, electrical, precision and general engineers, etc. Nom. cap.: £100. Dirs.: Arthur W. Harris and Celia Harris.

W. M. Herdman Manufacturing Co. Ltd., Well St, Finedon, Northants. To take over business of electrical contractors and television aerial manufacturers carried on at Corby, Northants, by W. M. Herdman, etc. Nom. cap.: £2,000. Permanent dirs.: Wm. M. Herdman and Mrs Elizabeth T. Herdman.

James Lee (Domestic Appliances) Ltd., 30 St. Helens Rd, Bolton. To acquire such part of the business carried on by James Lee at Bolton, as is concerned with dealing in domestic appliances, etc. Nom. cap.: £7,500. Dirs.: James Lee and Norah Lee.

James Lee (Electrical Contractors) Ltd. Nom. cap.: £10,000. To acquire such part of the business carried on by James Lee at Bolton as is concerned with electrical contracting, etc. Other details similar to James Lee (Domestic Appliances) Ltd.

Lomax and Staines (Witney) Ltd., 76 High St, Bedford. Electricians, etc. Nom. cap.: £1,000. Dirs.: Douglas J. B. Lomax and John F. W. Staines.

Harry Marsden Ltd., 175 Dickson Rd, Blackpool. To take over the business of electrical contractors carried on at 26 Airedale Ave, Marton, Blackpool, etc. Nom. cap.: £2,000. Dirs.: Harry Marsden and Kathleen R. Marsden.

McCombie Davis Ltd., The Old Treasure Hse, Oxted. To take over the business of wireless, television and electrical engineers and suppliers carried on by L. W. McCombie and B. D. Davis at The Old Treasure Hse, Oxted, and at Clive Cottage, Bletchingly, etc. Nom. cap.: £3,000. Dirs.: Leonard W. McCombie and Bryan D. Davis.

Novano Ltd., Jubilee Rd, Letchworth, Herts. Manufacturers of and dealers in mechanical, electrical and electro-mechanical equipment and machinery, etc. Nom. cap.: £100. Dirs.: Frederick W. Clegg and Roland F. Perrolls.

Gazette Announcements

COMPANIES ACTS

Lithgow Electronics Ltd. Mr S. J. Chubb, Bartlett Hse, 9/12 Basinghall St, E.C.2, appointed liquidator at extraordinary general meeting on 26 May for the purpose of voluntarily winding-up.

H. A. Parry and Partners Ltd. Mr R. Langdon-Davis, Dashwood Hse, Old Broad St, E.C.2, appointed liquidator at extraordinary general meeting on 9 June for the purpose of voluntarily winding-up.

Range Electronics Ltd. Petition for winding-up to be heard before the High Court of Justice, Strand, W.C.2, on 4 July. Persons intending to appear to notify Wild Collins and Crosse, 6 Old Jewry, E.C.2, by 2 July.

South Wales Electrical Engrs. Ltd. Dividend per £: 3s 6½d, payable at 106 Walter Rd, Swansea, on 4 July.

Anglian Cable and Eng. Co. Ltd. Liquidator, R. A. Paterson, Archdeacons Hse, Northgate St, Ipswich, released as from 8 June.

Partnership Dissolved

Newcastle upon Tyne. Partnership between M. Mulcahy, P. Ruff and F. W. Ruff, carrying on business as New World Electrical Appliances at 46 Heaton Rd, dissolved as from 16 May. All debts to be paid by P. Ruff and F. W. Ruff who are carrying on the business.

BANKRUPTCY ACTS

Receiving Order

Nottingham. P. M. Townroe, retailer of domestic electric appliances, carrying on business at 13 Woodhouse Rd, at Pelham Rd and Somersall St, Mansfield, and also formerly at 65 Gateford Rd, Worksop. Receiving order dated 17 June.

Southend. L. A. G. Ayres, electrician, carrying on business as Len's Electrics, at 710 Southchurch Rd. Receiving order dated 21 June.

First Meetings and Public Examinations

High Court of Justice. F. T. Hunt and E. J. Little, wholesalers of electrical goods, formerly carrying on business in partnership as Sonboy Electric Co., at 24 Fore St, N.18. First meeting: 12 noon, 30 June, and public examination: 11 a.m. 16 Aug., both at Bankruptcy Bldgs, Carey St, W.C.2.

St. Albans. D. I. Boak, dealer in electrical goods, of Brigadoon Hse, Ellingham Rd, Hemel Hempstead. First meeting: 11.30 a.m. 1 July, at 58/61 York Terr, Regent's Pk, N.W.1, and public examination: 11 a.m. 14 Sept., at Town Hall, St. Albans.

Southampton. D. G. Mayell, electrical contractor and domestic appliance retailer, carrying on business as Electroservice at 82 Park Rd, Freemantle. First meeting: 11 a.m. 30 June at Official Receiver's Office, 16 Westwood Rd, Southampton, and public examination: 10.30 a.m. 26 Sept., at County Court, Castle Sq, Southampton.

Coventry. D. A. Jolley and J. F. Laight, retailers, formerly carrying on business as Supreme Electrical Products at 105 Far Gosford St. Public examination: 11.15 a.m. 25 July, at County Hall, Coventry.

Derby. W. B. Brookes, electrical contractor, formerly carrying on business at 147 Chellaston Rd, Shelton Lock. Public examination: 10 a.m., 9 Aug., at Court Hse, 20 St. Peter's Church Yd, Derby.

Macclesfield. C. Davies, electrical contractor, of 39 Moss Brow, West Bollington, Chester. Public examination: 11 a.m., 4 Oct., at Town Hall, Macclesfield.

Release of Trustee

Portsmouth. S. R. L. Sutton, electrical dealer, carrying on business as Sutton and Sons at 127 Sultan Rd. Trustee: A. H. Horler, 16 Westwood Rd, Southampton, released as from 14 June.

MEETINGS TO NOTE

TUESDAY, 5 JULY

ROYAL AGRICULTURAL SOCIETY SHOW at Cambridge until 8 July.

WEDNESDAY, 6 JULY

A.S.E.E. (N. London Branch). "The Work of the N.I.C.E.I.C.". H. C. Breeze. Wood Green Civic Centre Town Hall, N.22. 8 p.m.

A.S.E.E. (Preston Branch). "Connectors and Crimped Joints." R.A.F.A. Club, East View. 7.30 p.m.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

AMC in design. 801,665. Class 9. Apparatus, etc. Apparatus Mnfg. Co. Ltd., Southvale Wks, Blackheath Village, S.E.3.

Anotrol. 800,140. Class 9. Apparatus, etc. De Havilland Propellers Ltd., Manor Rd, Hatfield, Herts.

Arcomet. 798,756. Class 9. Contacts, electrodes, switchgear, etc. Metro-Cutanit Ltd., Grappehall, Warrington, Lancs.

Cablok. 801,205. Class 6. Cleats, etc. Cable Supports Ltd., 303 Brixton Rd, S.W.9.

Clarafon. 799,555. Class 9. Telephonic apparatus, etc. Multitone Electric Co. Ltd., 12-20 Underwood St, N.1.

Dormy. 801,458. Class 10. Heated blankets. Wormalds and Walker Ltd., Dewsbury Mills, Thornhill Rd, Dewsbury.

Magni-seal. 801,097. Class 11. Refrigerators, etc. A.E.I.-Hotpoint Ltd., 33 Grosvenor Pl, S.W.1.

Minister. 795,342. Class 9. Vacuum cleaning apparatus, etc. Bylock Electric Ltd., 109 South St, Enfield, Middx.

Miracoal. 799,063. Class 11. Imitation coal fires. Willet and Robinson Ltd., Prentis Chmbrs, 39 Earl St, Maidstone.

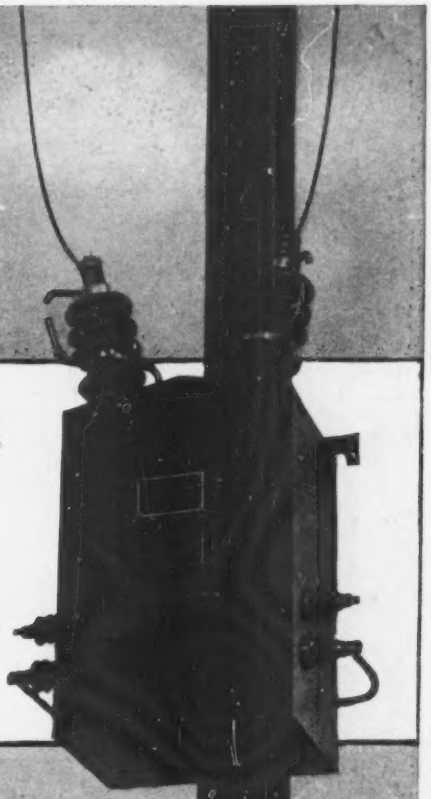
Planlite. 798,622. Class 11. Lamps, etc. Lamp Mnfg. and Railway Supplies Ltd., Vincent Wks, Vincent La, Dorking, Surrey.

S in design. 777,215. Class 7. Drill chucks, speed changers and tools for use with portable electric and pneumatic tools, etc. Supreme Products Corpn., 2222 South Calumet Ave, Chicago, Ill., U.S.A.

Silver Star. 796,827. Class 9. Capacitors. Johnson Matthey and Co. Ltd., 78 Hatton Gdn, E.C.1.

Stabkaps. 801,733. Class 9. Capacitors. Stability Capacitors Ltd., Commerce Estate, Raven Rd, E.18.

Maximum Economy in Capital and Operating Costs...



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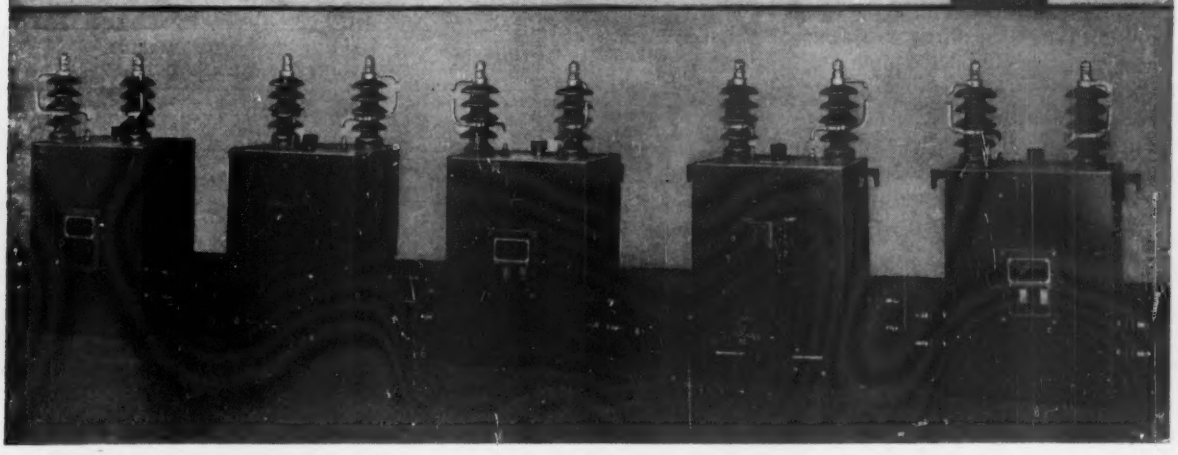
HACKBRIDGE AND HEWITTIC ELECTRIC CO. LTD.

Walton-on-Thames, Surrey, England

Telephone: Walton-on-Thames 28833 (8 lines)

Telegrams and Cables: "Electric" Walton-on-Thames

Illustrated: above, 10kVA and below 15kVA units.



OVERSEAS REPRESENTATIVES: ARGENTINA: H. R. Roberts & Cia., S.R.L. Buenos Aires. **AUSTRALIA:** Hackbridge and Hewittic Electric Co. Ltd., 171 Fitzroy Street, St. Kilda, Victoria; N.S.W.: Queensland: W. Australia: Elder, Smith & Co. Ltd.; South Australia: Parsons & Robertson Ltd.; Tasmania: H. M. Bamford & Sons (Pty.) Ltd., Hobart. **BARBADOS** and surrounding islands: Electric Sales & Service Ltd., St. Michael. **BELGIUM & LUXEMBOURG:** Pierre Pollie, Brussels, 3. **BRAZIL:** Oscar G. Mors, Sao Paulo. **BRITISH GUIANA:** Dandor Commission Agency, Georgetown. **BURMA:** Neonlite Manufacturing & Trading Co. Ltd., Rangoon. **CANADA:** Hackbridge and Hewittic Electric Co. of Canada Ltd., Montreal: The Northern Electric Co. Ltd., Montreal, etc. **CEYLON:** Envee Ess Ltd., Colombo. **CHILE:** Sociedad Importadora del Pacifico Ltda., Santiago. **EAST AFRICA:** G. A. Neumann Ltd., Nairobi. **EGYPT:** Giacomo Cohenca Fils, S.A.E., Cairo. **FINLAND:** Sahko-ja Konelilke O.Y. Hermes, Helsinki. **GHANA, NIGERIA & SIERRA LEONE:** Glyndova Ltd. **GREECE:** Charilaos C. Coroneos, Athens. **INDIA:** Steam & Mining Equipmen (India) Private Ltd., Calcutta: Easun Engineering Co. Ltd., Madras, 1. **IRAQ:** J. P. Bahoshy Bros., Baghdad. **MALAYA, SINGAPORE & BORNEO:** Harper, Gilfillan & Co. Ltd., Kuala Lumpur. **NETHERLANDS:** J. Kater, E.O., Ouderkerk a.d. Amstel. **NEW ZEALAND:** Richardson, McCabe & Co. Ltd., Wellington, etc. **PAKISTAN:** The Karachi Radio Co., Karachi, 3. **SOUTH AFRICA:** Arthur Trevor Williams (Pty.) Ltd., Johannesburg, etc. **CENTRAL AFRICAN FEDERATION:** Arthur Trevor Williams (Pty.) Ltd., Salisbury. **THAILAND:** Vichien Phanich Co. Ltd., Bangkok. **TRINIDAD & TOBAGO:** Thomas Peake & Co., Port of Spain. **TURKEY:** Dr. H. Salim Oker, Ankara. **URUGUAY:** Cuina Ltda., Montevideo. **U.S.A.:** Hackbridge and Hewittic Electric Co. Ltd., P.O. Box 234, Pittsburgh 30, Pennsylvania. **VENEZUELA:** Oficina de Ingenieria Sociedad Anonima, Caracas.

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The external finish of the Sangamo Model S200 Meter is taken care of by Bakelite mouldings—proved by more than 25 years of complete satisfaction. The internal finishes reflect the tremendous care in the choice of materials and finishes which has made the S200 the most advanced Watthour Meter of the day. Quantity production in the world's most modern meter factory leads in turn to production economies which are passed on to the user in the form of finer materials, finer specification . . . in short, a better meter for the money.

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CLASSIFIED ADVERTISEMENTS

TENDERS INVITED

ROYAL COUNTY OF BERKSHIRE

OXFORD SOUTHERN AND WESTERN BY-PASS

TENDERS are invited for the lighting of the Botley and Woodstock Road roundabouts on the above scheme.

The work consists of the supply and erection of twenty-eight 35 ft steel columns and lanterns and other works in accordance with the Contract Documents, which may be obtained from the County Surveyor, Shire Hall, Reading, on payment of a deposit of £2 returnable after a bona fide tender has been received.

Tenders to be delivered to the Clerk of the Council not later than the date marked on the envelope enclosed with the Contract Documents. (R 309)

CITY OF HEREFORD

ELECTRICAL INSTALLATION TO 102 TRADITIONAL HOUSES AND 10 BUNGALOWS REDHILL ESTATE—SECTION FIVE HEREFORD

TENDERS are invited for the wiring for electricity to 102 traditional houses and 10 bungalows on Redhill Estate, Section Five, Hereford.

Plan, Specification and form of Tender may be obtained from the City Architect, Town Hall, Hereford, upon deposit of £1 1s (returnable following the submission of a bona fide tender and return of all documents).

Tenders should be returned in the envelope provided and endorsed "Electrical Wiring—112 dwellings—Redhill 5" to reach the undersigned not later than 12 noon, on Monday, 11 July 1960.

T. B. FELTHAM,
Town Clerk.

Town Hall,
Hereford.
June, 1960. (R 275)

BOROUGH OF HERTFORD

STREET LIGHTING CONVERSION AND IMPROVEMENT SCHEME

THE Corporation propose to carry out the above scheme during 1960 and 1961 and intend to invite tenders from short lists of erection contractors, column manufacturers and suppliers of lanterns and equipment. Experienced firms are now invited to submit their names for inclusion on these lists.

The scheme will include:

(a) 30 No. 400 watt mercury fluorescent units in the Town Centre.
(b) 268 No. 200 watt and 140 watt sodium units on the main traffic routes.
(c) 203 No. 60 watt sodium units on the secondary traffic routes.
(d) 338 No. 100 watt tungsten units, using existing gas lamp columns in residential areas.

Applications by letter in suitably endorsed envelopes to be received by the Town Clerk, not later than 9 a.m. on Wednesday, 13 July, 1960.

A. I. CLOUGH,
Town Clerk.

The Castle,
Hertford.
16 June, 1960. (R 221)

BOROUGH OF MORLEY

TRUNK ROAD LIGHTING—A58

TENDERS are invited for the supply, installation and putting into service of 36 totally enclosed 140 W sodium street lighting units mounted on 25 ft concrete columns on the above road.

Forms of tender may be obtained from the Public Lighting Engineer, Town Hall, Morley, and must be returned to the undersigned not later than 9 a.m., Monday, 18 July, 1960.

E. V. FINNIGAN,
Town Clerk.

Town Hall,
Morley,
Yorkshire. (R 278)

CITY OF HEREFORD

ELECTRICAL INSTALLATION TO 62 TRADITIONAL HOUSES ON NEWTON FARM ESTATE SECTION FOUR—HEREFORD

TENDERS are invited for the wiring for electricity to 62 traditional houses on Newton Farm Estate—Section 4—Hereford.

Plan, Specification and form of Tender may be obtained from the City Architect, Town Hall, Hereford, upon deposit of £1 1s (returnable following the submission of a bona fide tender and return of all documents).

Tenders should be returned in the envelope provided and endorsed "Electrical Wiring—62 houses—Newton Farm 4" to reach the undersigned not later than 12 noon on Monday, 11 July, 1960.

T. B. FELTHAM,
Town Clerk.

Town Hall,
Hereford.
June, 1960. (R 274)

CITY OF HEREFORD

ELECTRICAL INSTALLATION TO 105 TRADITIONAL HOUSES REDHILL ESTATE—SECTION FOUR HEREFORD

TENDERS are invited for the wiring for electricity to 105 traditional houses on Redhill Estate, Section 4, Hereford.

Plan, Specification and form of Tender may be obtained from the City Architect, Town Hall, Hereford, upon deposit of £1 1s (returnable following the submission of a bona fide tender and return of all documents).

Tenders should be returned in the envelope provided and endorsed "Electrical Wiring—105 houses—Redhill 4" to reach the undersigned not later than 12 noon on Monday, 11 July, 1960.

T. B. FELTHAM,
Town Clerk.

Town Hall,
Hereford.
June, 1960. (R 273)

APPOINTMENTS VACANT

MINISTRY OF AVIATION

REQUIRES TECHNICIAN at Malvern, Worcs, for preparation of technical publications on radar and electronic equipment. Qualifications: recognised engineer-

continued in next column

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ing apprenticeship or equivalent training in an appropriate trade. H.N.C. or equivalent qualifications. Experience either in radar or electronics. Previous experience of writing or editing technical publications advantageous. Salary £1,005/£1,220 p.a. Forms from Ministry of Labour, Technical and Scientific Register (K), 26 King St, London S.W.1, quoting D.446/OA. (R 284)

SOUTH WESTERN ELECTRICITY BOARD

South Western ELECTRICITY

APPLICATIONS are invited for the following position:

SECOND ASSISTANT DISTRICT COMMERCIAL ENGINEER (CONTRACTING) EXETER

Salary within Class G, Grade 8, £910 x £15—£955 per annum, of the N.J.B. Agreement.

The candidate appointed will be responsible to the First Assistant District Commercial Engineer (Consumer Service and Contracting) for electrical installation contracting throughout the District. The duties and responsibilities attached to the post will include the preparation of specifications and estimates for all classes of wiring installations; the preparation of lighting and heating schemes, including heat loss calculations, and the supervision of the larger electrical installation contracts.

Applicants should have had considerable experience of electrical installation work, including the preparation of estimates. The possession of the Higher National Certificate in Electrical Engineering or qualifications leading to it, would be an advantage. The ability to drive a car, and the possession of a current driving licence is desirable.

Applications to be made on standard form AE6/ACT OBTAINABLE BY POSTCARD ONLY from the District Manager, South Western Electricity Board, 3 Bedford St, Exeter. Closing date for receipt of completed applications is Saturday, 16 July, 1960. (R 297)

ISLE OF MAN ELECTRICITY BOARD

ENGINEER AND SECRETARY

APPLICATIONS are invited for the appointment of Engineer and Secretary to the Board at a salary of £1,950 per annum.

Applicants should be Corporate Members of the Institution of Electrical Engineers with experience in all branches of electricity supply work.

Further information regarding the appointment and a form of application obtainable from the Engineer and Secretary, Isle of Man Electricity Board, Harcroft, Douglas, Isle of Man. (R 308)

EASTERN ELECTRICITY BOARD

Area Headquarters

ASSISTANT APPRENTICE INSTRUCTOR 157/60.N.

APPLICATIONS are invited for this post on Area Headquarters Staff but located at the Apprentice's Training Centre at Harold Hill, Romford, Essex.

Candidates should have served a regular apprenticeship in Mechanical Engineering, and have had considerable practical experience. Duties will include instruction of apprentices in basic workshop practice.

Salary: N.J.I.C. Schedule E, Grade 2 (£725) plus London Allowance, £35.

Apply by letter to the Secretary, Eastern Electricity Board, P.O. Box No. 40, Wherstead, Ipswich, Suffolk, by 16 July, 1960. (R 295)

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 40s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

SOUTHEND WATERWORKS COMPANY

ASSISTANT ENGINEER
(MECHANICAL AND ELECTRICAL)

APPLICATIONS are invited for the appointment of Assistant Engineer (Mechanical and Electrical) at a commencing salary of between £1,200 and £1,350, according to age and experience.

Applicants should have a sound training with workshop and drawing office experience and have a professional qualification. Preference will be given to applicants with experience in waterworks pumping installations.

The appointment, which will be terminable by one month's notice on either side, will be subject to a satisfactory medical report, after which the applicant will be required to join the Company's superannuation scheme.

The successful candidate will be required to take up his duties not later than 1 Oct., 1960.

Applications endorsed "Assistant Engineer (Mechanical and Electrical)" stating age, qualifications and experience, and the names and addresses of three persons to whom reference may be made, should be sent to The General Manager, 13 Cambridge Rd, Southend-on-Sea, not later than 6 August, 1960. (R 263)

YORKSHIRE ELECTRICITY BOARD

No. 3 (Sheffield) Sub-Area

THIRD ASSISTANT ENGINEER
(SYSTEM STANDARDISATION)

APPLICANTS should have technical qualifications equivalent to Graduate Membership of the Institution of Electrical Engineers and should have had experience on high voltage electrical distribution systems.

Salary: N.J.B. Class M, Grade 10, £1,095 x £25—£1,170 per annum.

SENIOR DRAUGHTSMAN (ELECTRICAL)

N.J.B. Schedule D, Grade 5, £790/£890 per annum.

ENGINEERING DRAUGHTSMAN
(ELECTRICAL)

N.J.B. Schedule D, Grade 6, £620/£740 per annum.

Applicants should have had experience in the preparation of electrical drawings.

SENIOR DRAUGHTSMAN (CIVIL)

N.J.B. Schedule D, Grade 5, £790/£980 per annum.

Applicants should have had experience in the preparation of building drawings.

ENGINEERING DRAUGHTSMAN (CIVIL)

N.J.B. Schedule D, Grade 6, £620/£740 per annum.

Applicants should have had experience in the preparation of simple building drawings.

Applications, giving full details of age, qualifications and experience, together with names of two referees, should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial St, Sheffield, not later than 15 July, 1960.

No. 5 (Wakefield) Sub-Area

BARNSLEY DISTRICT
THIRD ASSISTANT DISTRICT ENGINEER

Applicants should have had a sound practical training and experience in the construction, operation and maintenance of H.V. and M.V. overhead and underground distribution networks, substation plant and ancillary equipment.

Candidates should have attained the technical standard of the Higher National Certificate in Electrical Engineering, or equivalent qualifications.

Candidates must be prepared to reside in the District and undertake stand-by duties.

Salary: N.J.B. Class J, Grade 9, £965 x £20—£1,025 per annum.

CASTLEFORD DISTRICT
SERVICE CENTRE SUPERVISOR

Applicants must be thoroughly experienced in Service Centre work including the sale of electrical appliances, hire purchase procedure, handling of consumers' enquiries, display, and must be capable of advising consumers on any matters relating to electricity in the home. The successful applicant will be responsible for the internal organisation of the Service Centre and the control of staff including a Demonstrator, Trainee

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Demonstrator and Trainee Service Centre Assistant. Suitable qualifications will be an advantage.

Salary: N.J.C. Grade, £885 x £25—£960 per annum.

DONCASTER DISTRICT
ASSISTANT CONSUMER'S ENGINEER

This post offers an opening for a young man with the technical standard of the Ordinary National Certificate in Electrical Engineering who has preferably already had some training in installation work. He will be given training in the various aspects of commercial work in the District, dealing with new and increased supplies to small industrial and commercial consumers, street lighting negotiations and tariff queries. He will initially be required to supervise the Installation Inspectors and to render general assistance to the Consumers' Engineer.

Salary: N.J.B. Class H, Grade 13, £710 x £15—£755 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Rd, Wakefield, not later than 15 July, 1960.

No. 1 (Bradford) Sub-Area

KEIGHLEY DISTRICT
THIRD ASSISTANT DISTRICT ENGINEER

Applicants should have passed the Associate Membership Examination of the Institution of Electrical Engineers or hold equivalent qualifications, and have experience in construction, operation and maintenance of high voltage systems, underground cables, overhead lines and substations, and medium low voltage networks.

Candidates should be prepared to reside within the District and undertake standby duties.

Salary: N.J.B. Class F, Grade 9, £815 x £15—£860 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 1 (Bradford) Sub-Area, Yorkshire Electricity Board, 45-53 Sunbridge Rd, Bradford, not later than 15 July, 1960.

No. 6 (Hull) Sub-Area

GOOLE DISTRICT
ASSISTANT CONSUMER'S ENGINEER

Applicants should have had a good commercial training and have had experience of negotiating with consumers for new and increased supplies and be able to give advice on tariffs and the use of electricity generally to domestic, commercial and small industrial consumers. The duties will also include supervision of Service Centres and outside Sales Staff.

Possession of the Ordinary National Certificate in Electrical Engineering or equivalent qualification will be an advantage.

Salary: N.J.B. Class F, Grade 9, £815 x £15—£860 per annum.

BRIDLINGTON DISTRICT
THIRD ASSISTANT DISTRICT ENGINEER
(COMMERCIAL)

Applicants should have had a sound practical training in electrical installation work, and have an up-to-date knowledge of the utilisation of electricity on farms. The successful applicant will be required to negotiate with consumers requiring electricity supplies, particularly in rural areas, and deal with estimates for installations, tariffs and sales development generally.

Candidates must hold at least the Ordinary National Certificate in Electrical Engineering, or equivalent qualifications.

Salary: N.J.B. Class E, Grade 9, £765 x £15—£810 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Kingston upon Hull, not later than 15 July, 1960.

Head Office

FOURTH ASSISTANT ENGINEER

Applications are invited for the position of Fourth Assistant Engineer in the

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Development Section of the Commercial Department at Head Office.

Applicants should have a Higher National Certificate in Electrical Engineering and some practical training and experience (apprenticeship or otherwise).

Duties will include work on the general applications of electricity including off-peak space heating; interpretation of I.E.E. Wiring Regulations as they apply to general contracting; collecting and collating of information on technical matters; interpretation and/or drawing up of specifications, safety rules, codes of practice, etc., correspondence.

Salary: N.J.B. Schedule B, Class AX/EX, Grade 8, £735 x £25—£860 rising to £960 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Secretary, Yorkshire Electricity Board, Wetherby Rd, Scarcroft, Leeds, not later than 15 July, 1960. (R 301)

AIR MINISTRY

REQUIRE ASSISTANT MECHANICAL and ELECTRICAL ENGINEERS for design, construction and maintenance of installations on airfields, radar stations, missile bases, workshops and maintenance units for R.A.F. at home and overseas as well as certain Civil Airports. Salary: £805 at 25 to £1,095 at 34 or over, thereafter rising to max. £1,260 with increase for London and slight decrease for country districts. Appointments non-pensionable but long term. Promotion prospects. Five-day week with four weeks' two days' leave a year initially. Special allowance in addition to salary during overseas service. Quals. and experience:

(i) (a) University degree or equiv. diploma in electrical and/or mechanical engineering with at least two years' apprenticeship;

or (b) Graduate or corporate member of I.E.E. with at least three years' apprenticeship;

or (c) Graduate or corporate member of I.Mech.E., appreciable electrical engineering experience with at least three years' apprenticeship;

and (ii) Have been employed for minimum of two years with well established engineering concern and gained wide experience in both electrical and mechanical engineering practice.

Applicants must be natural born British subjects between ages of 25 and 45. Forms from Ministry of Labour, Technical and Scientific Register (K), 26 King St, London S.W.1, quoting D.158/OA. (R 21)

THE NORTH EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:

Area Board Headquarters

CHIEF COMMERCIAL OFFICER'S
DEPARTMENT

FOURTH ASSISTANT ENGINEER
COMMERCIAL AND DOMESTIC SECTION
CARLIOL HOUSE

Applicants should have experience and be interested in all aspects of commercial load development with particular reference to thermal storage space heating and preferably possess H.N.C. in electrical engineering.

Salary: Schedule B, Grade 9, Class AX, £840/£1,055. N.J.B. Conditions of Service.

Tees Sub-Area

FIRST ASSISTANT DISTRICT COMMERCIAL
ENGINEER
DARLINGTON

Salary: Schedule A, Class F, Grade 5, £1,010/£1,130. N.J.B. Conditions of Service.

Applications stating age, qualifications and experience to be received by Assistant Secretary (Establishments), The North Eastern Electricity Board, G.P.O. Box 117, Carliol Hse, Newcastle upon Tyne, within ten days of the appearance of this advertisement. (R 302)

Box No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London, W.C.2

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Division

ASSISTANT ENGINEER
(DIVISIONAL HEADQUARTERS)

FOURTH ASSISTANT ENGINEER required in the Electrical Department at Divisional Headquarters.

N.J.B. Agreement conditions. Superannuable appointment, salary within Schedule B, either Grade 9, 10 or 11, according to qualifications and experience. The salary ranges are as follows:

Grade 9: £840/£1,130 per annum.
Grade 10: £785/£1,055 per annum.
Grade 11: £735/£990 per annum.

Candidates should possess a Higher National Certificate in Electrical Engineering or an equivalent qualification and should have had some experience on equipment associated with E.H.V. transmission.

Apply, quoting vacancy number 153/60MD on form AE6 available from the Establishments Officer, 53 Wake Green Rd, Moseley, Birmingham 13, not later than 11 July, 1960. (R 277)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:

Shropshire and Herefordshire Sub-Area

SENIOR ASSISTANT
(EDUCATION AND TRAINING)
(HEADQUARTERS)

Duties will include the implementation and administration throughout the Sub-Area of the Board's Educational and Training Schemes for all personnel. Applicants should have had experience in the administration of training schemes and in particular Craft and Student Apprenticeships. The possession of an appropriate professional qualification or University degree will be considered an advantage. Salary £885/£960 per annum (N.J.C. Grade 5).

THIRD ASSISTANT DISTRICT ENGINEER
(HEREFORD)

Duties involve the construction, maintenance and operation of H.V. and L.V. overhead and underground mains and substations. Technical qualifications desirable. Salary £800/£875 per annum (N.J.B. Grade F.9).

Apply, by letter, within 14 days, stating age, experience, present position and salary to Mr W. Winwood, Sub-Area Manager, Midlands Electricity Board, Spring Gdns, Ditherington, Shrewsbury.

South Staffs & North Worcs Sub-Area

DISTRICT COMMERCIAL ENGINEER
(STOURBRIDGE)

Applicants should have had extensive experience in the industrial and domestic aspects of commercial work, including installations and sales and service to the consumer. Technical qualifications desirable. Salary £1,195/£1,270 per annum (N.J.B. Grade F.3).

THIRD ASSISTANT COMMERCIAL ENGINEER
(HEADQUARTERS)

Applicants should be well experienced in industrial load development, preparation of specifications and quotations for industrial commercial installations and the planning and supervision of large installations. A good knowledge of modern industrial processes is essential. Salary £1,025/£1,085 per annum (N.J.B. Grade L.10). It is expected that the classification will be raised to "M" with effect from 1 April, 1960.

FIRST ASSISTANT DISTRICT COMMERCIAL ENGINEER
(STOURBRIDGE)

Applicants should have had experience in the industrial and domestic aspects of commercial work, including installations and sales and service to the consumer. Technical qualifications desirable. Salary £965/£1,025 per annum (N.J.B. Grade F.6).

FIRST ASSISTANT DISTRICT COMMERCIAL ENGINEER
(BRIERLEY HILL)

Applicants should have had experience in the industrial and domestic aspects of commercial work, including installations and sales and service to the consumer. Technical

continued in next column

continued from previous column

qualifications desirable. Salary £965/£1,025 per annum (N.J.B. Grade F.6). It is expected that the classification will be raised to "G" with effect from 1 April, 1960.

THIRD ASSISTANT DISTRICT COMMERCIAL ENGINEER
(SMETHWICK/WEST BROMWICH)

The duties will include estimating for and supervising electrical installation work on consumers' premises. Applicants should have a sound technical training and experience of installation practice. Technical qualifications desirable. Salary £910/£955 per annum (N.J.B. Grade J.10). It is expected that the classification will be raised to "K" with effect from 1 April, 1960.

Apply, by letter, within 14 days, quoting ref. SS/T/475, SS/T/478, SS/T/476, SS/T/477, or SS/T/469, respectively, and stating qualifications for the post to Mr H. A. P. Caddell, Sub-Area Manager, Midlands Electricity Board, P.O. Box No. 9, Toll End Rd, Tipton, Staffs.

Worcester & District Sub-Area

WAYLEAVE OFFICER/SURVEYOR
(REDDITCH/BROMSGROVE)

Duties include surveying, profiling, plotting of routes, and negotiation and preparation of Wayleave Agreements, etc. Salary £720/£780 per annum (N.J.C. Grade 3).

Apply, by letter, within 14 days, stating age, experience, present position and salary to District Manager, Midlands Electricity Board, Windsor Rd, Redditch.

F. W. CATER,
Secretary.
(R 282)

CENTRAL ELECTRICITY GENERATING BOARD

Eastern Division

APPLICATIONS are invited for the following appointments in the Divisional Electrical Department:

SENIOR ASSISTANT ENGINEERS
(SYSTEM DEVELOPMENT)
DIVISIONAL HEADQUARTERS
(COCKFOSTERS, N. LONDON)
(S.V. No. 1360)

Salary: N.J.B., Class AX/DX, Grade 2, £1,475 x £25—£1,600/£1,705 per annum, plus London Weighting.

The successful applicant will be responsible for system design reinforcements entailing the technical and economic appraisal of schemes and the submission of reports.

A knowledge of network analyser practice, symmetrical component analysis, and of the design and layout of high voltage transmission systems would be an advantage. Initiative in system design is essential. Applicants should have had a sound technical training and experience in this type of work and/or in the construction and operation of high voltage transmission systems. They should be corporate members of the Institution of Electrical Engineers or possess equivalent qualifications in electrical engineering.

FOURTH ASSISTANT ENGINEER
(SECTION)
ROMFORD TRANSMISSION SECTION
(ESSEX)
(S.V. No. 1361)

Salary: N.J.B., Class AX/DX, Grade 7/8, £735 x £25—£965/£1,040 per annum, plus London Weighting.

The commencing grade and salary will depend upon the qualifications and experience of the successful applicants who will be required to reside within a reasonable distance of Romford, Essex.

Applicants should preferably hold a Corporate or Graduate Membership of the Institution of Electrical Engineers, or equivalent qualification, and have experience in the operation and maintenance of high voltage overhead lines, cables and substation equipment up to 275 kV.

Applications, quoting the appropriate Reference S.V. No., stating age, qualifications, experience and present position should be sent to the Controller, Central Electricity Generating Board, Eastern Division, West Farm Pl, Chalk La, Cockfosters, Barnet, Herts, to arrive not later than 9 July, 1960. (R 262)

SARAWAK ELECTRICITY SUPPLY CO. LTD.

ELECTRICAL ENGINEER for one tour of three years with prospects of renewal. Salary according to age, qualifications and experience in scale (including Inducement Pay), £1,512 rising to £2,009 a year. No Income Tax at present. Provident fund. Free passages. Quarters provided at reasonable rent. Liberal leave on full salary. Candidates, 30-45 years, must be Corporate Members of the I.E.E. or possess recognised equivalent qualifications. They must have served an apprenticeship to electrical engineering and have had subsequent electricity supply experience as a Mains Engineer or Distribution Engineer. Some knowledge of the operation of diesel engine power stations would be an advantage. Write to the Crown Agents, 4 Millbank, London S.W.1. State age, name in block letters, full qualifications and experience and quote M2A/51055/EE. (R 266)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments. The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Area Headquarters

WHERSTEAD, IPSWICH
159/60.R.
FOURTH ASSISTANT ENGINEER
(COMMERCIAL)
PLANNING, POLICY AND DEVELOPMENT SECTION

Candidates should preferably have technical qualifications and some practical experience of designing and installing electric space heating and water heating systems. Experience of non-electric heating systems will be an advantage.

The successful applicant will be required to assist the Heating Engineer with the development of space and water heating techniques, systems and appliances, to prepare technical reports on laboratory and field investigations of installation and running costs and generally to assist with other similar work of the Section.

Salary from 1 July, 1960. N.J.B. Grade 11, new Class BX, Schedule B. From 1 July, 1960, to 30 June, 1961, £735/£990.

This appointment should be regarded by candidates as an opportunity to gain valuable experience over a period of about two years which would fit them for promotion to more general commercial posts.

Apply by letter within 14 days to the Chief Commercial Officer, Eastern Electricity Board, P.O. Box No. 40, Wherstead, Ipswich, Suffolk.

Essex Sub-Area

SOUTHEND DISTRICT
160/60.R.
FOURTH ASSISTANT ENGINEER

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. overhead and underground systems including sub-stations.

Salary from 1 July, 1960, N.J.B. Class H, Grade 11 (£800/875).

Apply by letter within 14 days to J. Linton, A.H.W.C., M.I.E.E., A.I.MECH.E., Manager, Southend District, Eastern Electricity Board, 85 London Rd, Southend-on-Sea, Essex.

Suffolk Sub-Area

HEADQUARTERS, STOWMARKET
161/60.R.
FOURTH ASSISTANT ENGINEER
(PLANNING AND DEVELOPMENT SECTION)

Candidates should have had a sound technical training and will be required mainly to assist in the layout and design of high and low voltage overhead and underground schemes. They should possess the Higher National Certificate in Electrical Engineering or its equivalent.

Salary: from 1 July, 1960, N.J.B. Class K, Grade 13 (£800 x £15—£875).

Apply by letter within ten days to the Secretarial Officer, Suffolk Sub-Area, Eastern Electricity Board, Finborough Hall, Stowmarket. (R 312)

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division

APPLICATIONS invited for the following superannuable N.J.B. appointments in the South Wales Division:

DEPUTY STATION SUPERINTENDENT
CARDIFF POWER STATION
Vacancy No. 164/ET/60.

Salary: F.3 (£1,195/£1,270 per annum).

Applicants should preferably be Corporate Members of the Institution of Mechanical and/or Electrical Engineers and have had considerable experience in the operation, maintenance and administration of a modern power station.

MAINTENANCE ENGINEER (MECHANICAL)
LLYNFI POWER STATION
BRIDGEND, GLAM.
Vacancy No. 165/ET/60.

Salary: G.6 (£1,025/£1,085 per annum).

Applicants should have had experience of power station maintenance and should preferably be Corporate Members of the Institution of Mechanical Engineers.

Special application forms obtainable from Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-Fedwen Rd, Gabalfa, Cardiff, to be returned by 15 July, 1960. (R 311)

LONDON ELECTRICITY BOARD

ASSISTANT DISTRIBUTION ENGINEER

APPLICATIONS are invited for the above position in the Board's North Eastern District at Church Hill, Walthamstow, E.17.

Applicants should have had a sound technical education to the standard of the Higher National Certificate, and possess practical experience in all branches of engineering work associated with the organisation of a District distribution department.

The post is graded under Schedule A of the National Joint Board Agreement as Class G, Grade 11, £805 per annum rising to £860 per annum, inclusive of London Area Allowance.

Write for application form to Personnel Officer, 46 New Broad St, London E.C.2, quoting reference PER/V/3001/T. (R 287)

CENTRAL ELECTRICITY GENERATING BOARD

Southern Division

SECOND ASSISTANT STATION CHEMIST
PORTSMOUTH GENERATING STATION
SEC/3.87/T.

APPLICANTS should have had practical experience of fuel, water and oil testing appropriate to a generating station. A knowledge of boiler chemistry for high steam pressures and temperatures will be an advantage.

Preference will be given to candidates with H.N.C. in chemistry or equivalent qualifications.

Salary: N.J.B. H.11, £800/£875.

Special application forms obtainable only from Divisional Secretary, 111 High St, Portsmouth, should be returned by 12 July, 1960. Please quote reference number. (R 294)

CENTRAL ELECTRICITY GENERATING BOARD

Southern Division

FOURTH ASSISTANT ENGINEERS
TECHNICAL DEPARTMENT
SEC/3.88.

THERE is a vacancy for a Fourth Assistant Engineer in each of the Technical Areas of the Southern Division. These are at Poole, Portsmouth, Swindon and Reading.

Applicants should have experience of electrical engineering in relation to protective gear including testing and a knowledge of modern switchgear practice is desirable.

Preference will be given to those possessing or studying for qualifications leading to membership of a professional engineering institution or equivalent qualifications.

Salary: N.J.B., AX. 11, £735/£930.

Special application forms (Not A.E.6/ACT) obtainable only from Divisional Secretary, 111 High St, Portsmouth, should be returned by 13 July, 1960. (R 313)

THE NORTH WESTERN ELECTRICITY BOARD

SECOND ASSISTANT DISTRICT ENGINEER
BURY DISTRICT

THE duties will include assisting the District Engineer in the construction, operation and maintenance of the 33 kV, 11 kV and low voltage distribution systems.

The successful applicant will be responsible for a section of the District and should be prepared to undertake stand-by duties.

Applicants should preferably be Corporate Members of the Institution of Electrical Engineers.

Salary scale: £1,010/£1,130 p.a. Grade H.7. N.J.B. Conditions.

Application forms to be obtained from the Manager, No. 2 Sub-Area, The North Western Electricity Board, 2 St. George's Rd, Bolton, and to be returned to him by 13 July, 1960. (R 286)

AIR MINISTRY

Works Designs Branch

REQUIRES in London and Provinces ENGINEERING DESIGNER DRAUGHTSMEN experienced in preparation of schemes for illumination and electrical equipment of buildings or schemes for H.V. and M.V. electrical distribution. Candidates should have served recognised apprenticeship or had equivalent training and also have had practical experience. O.N.C. an advantage. Financial assistance and time off given for recognised courses of study. Promotion and pension prospects. Five-day week with 18 days paid leave per year initially. Overseas tours for which special allowances granted. Salary: in London ranges from £680 (at age 25) to £900 p.a. for men; from £673 to £868 for women. Somewhat lower in Provinces. Commencing salary dependent on age, qualifications and experience. Applicants, who must be natural born British subjects, should write to Air Ministry, W.G.d., Lacon Hse, Theobalds Rd, London W.C.1, or apply to any Employment Exchange quoting King's Cross 896, giving age, details of training, qualifications, full particulars of former posts held and copies of any testimonials. Candidates selected will normally be interviewed in London and certain expenses reimbursed. (R 283)

SOUTH EASTERN ELECTRICITY BOARD

CARTOGRAPHIC DRAUGHTSMAN
CROYDON AND PURLEY DISTRICT

SALARY £680 x £20—£740 per annum including London Allowance under N.J.C. Grade 2. Superannuable. Applicants should have a good general education, experience in a distribution drawing office, and be fully conversant with mains recording and preparation of system diagrams, etc. Applications quoting ET and naming two referees on forms from District Manager, Seeboard, Electric Hse, Wellesley Rd, Croydon, by 11 July, 1960.

GEORGE WRAY,
Secretary.
(R 299)

CENTRAL ELECTRICITY GENERATING BOARD

London Division

APPLICATIONS invited for following superannuable post. Conditions of service in accordance with N.J.B. Agreement, Schedule A. Salary includes London Allowance. Qualifications entitling to Corporate Membership an advantage.

DEPUTY POWER STATION
SUPERINTENDENT
WOOLWICH POWER STATION
Vacancy No. 60/466.

Applicants should be well qualified engineers with some experience of power station administration together with a good record in labour relations. Salary: Class H, Grade 3, £1,390/£1,575 per annum.

Applicants to vacancy notice 60/325 issued on 6 May, 1960, need not reapply.

Applications, quoting vacancy no., to (or on form from) Personnel Officer, Central Electricity Generating Board, London Division, P.O. Box 136, London W.1, by 12 July, 1960. (R 276)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Northern Area

SECOND ASSISTANT ENGINEER

APPLICATIONS are invited for the above appointment in the Area Engineering Department located at Dingwall, Ross-shire.

Applicants should have experience in the construction, operation and maintenance of electricity networks in a predominantly rural area.

The successful applicant will be required to undertake general duties principally in the Planning Department.

Salary scale: N.J.B. Grade, Class 8, £890/£990.

Minimum Technical Qualification: Higher National Certificate in Electrical Engineering.

Superannuation Scheme applicable.

Application forms are obtainable from the Area Manager, Church St, Dingwall, which should be returned by Friday, 29 July, 1960. (R 288)

LONDON COUNTY COUNCIL

PADDINGTON TECHNICAL COLLEGE

REQUIRED for September, 1960: EVENING CLASS INSTRUCTOR to teach Electrical Installation, Theory and Practice up to City and Guilds of London Institute Course "B" standard.

Further particulars from Head of Engineering Department (FE3a/ET/1705/7), Paddington Technical College, Saltram Cres, W.9. (R 300)

CENTRAL ELECTRICITY GENERATING BOARD

South Eastern Division

LITTLEBROOK POWER STATION
Vacancy No. 100A/60.

ASSISTANT ENGINEER
(MECHANICAL MAINTENANCE)

APPLICANTS should have had a wide practical experience in modern power station and boiler house maintenance on both coal and oil-fired boilers, and should possess H.N.C. or equivalent qualifications. A knowledge of the civil works associated with power stations would be an advantage.

Salary: N.J.B. Class L, Grade 11, £1,000/£1,105 per annum including London Allowance.

Applications giving age, details of experience, present position, etc., should be sent to the Station Superintendent, Littlebrook Power Station, nr. Dartford, Kent, to arrive by 13 July, 1960. (R 296)

LONDON COUNTY COUNCIL

ELECTRICAL ENGINEERING ASSISTANT

required to assist in preparing specifications for H.V. and M.V. plant, including switchgear, transformers and cabling, and/or general electrical installations in buildings.

For those obtaining H.N.C.(Elec.), prospects of advancement in entry grade to £1,250. Pension scheme. Staff restaurant. One Saturday only in every five. Form from Chief Engineer (GS/ET/1656/7), L.C.C., County Hall, S.E.1. (R 261)

GOVERNMENT OF JAMAICA

ENGINEER (REFRIGERATION)
PUBLIC WORKS DEPARTMENT

TO design and supervise the construction and maintenance of Government air-conditioning and refrigeration installations.

Contract appointment for three years. Salary in range £1,050/£1,300 a year. Gratuity 20% of salary. Free passages. Rented quarters.

Candidates up to 50 years must have passed or be exempt from the Associate Membership examination of the Institution of Electrical Engineers or the Institution of Mechanical Engineers, with relevant experience or have equivalent qualification in refrigeration engineering.

Write to Director of Recruitment, Colonial Office, London S.W.1, giving full names, age, qualifications and experience, quoting BCD.112/32/024/D10. (R 298)

ASSISTANT ELECTRICAL ENGINEERS

Senior and Intermediate Grades are invited to apply for vacancies in an expanding department of Consulting Engineers London Office, for work on industrial and commercial projects comprising the design, specification and estimates for power distribution schemes, electrical installations within buildings—heating, lighting and power.
Applicants should have served an apprenticeship or equivalent practical training together with experience in this work and must hold National Certificate or equal qualifications.
Applicants should send in confidence, education, training, age and experience to:—

FREDERICK S. SNOW & PARTNERS
Electrical Section
144 Southwark Street
LONDON, S.E.1

(R 303)

AN opportunity exists for a QUALIFIED ELECTRICAL ENGINEER of between 25 and 35 years old to join the editorial staff of the ELECTRICAL TIMES. Some evidence of writing ability desirable, but training in journalism will be given to the man appointed. The post offers interesting work and excellent opportunities to an engineer aiming at a broad knowledge of the electrical industry. Initial salary according to age. The position is pensionable and carries life insurance according to period of service. —Write The Editor, Sardinia House, Sardinia St, W.C.2.

BBC requires ENGINEER in Planning and Installation Department, London, initially to undertake work on power installations for transmitter and studio premises. Preference given to applicants capable of extending their field of activity to installation, testing and commissioning of radio frequency equipment. Opportunities to gain necessary experience. Applicants must be British subjects, preferably holding qualifications recognised for Graduate Membership of I.E.E. and should have had site installation practice and practical experience in manufacturer's works. Specific experience of diesel alternator installations desirable but not essential. Salary in scale £1,230/£1,580 p.a. commensurate with qualifications and experience. Requests for application forms to Engineering Recruitment Officer, Broadcasting Hse, London W.1, quoting ref.: 60.E.91.E.T. (R 279)

HUDSWELL, CLARK, & CO. LTD.

AN ELECTRICAL ENGINEER is urgently required to fill a vacancy in the electrical department of this old-established firm.

The work involved would deal with the design and utilisation of electrical equipment for a large variety of specialised mechanical machinery.

Applicants should possess H.N.C. Electrical (or equivalent qualifications) and have experience in the design and installation of control schemes and instrumentation.

Please apply in writing, giving age and a brief outline of career to date to:

The Chief Designer,
Hudswell, Clarke and Co. Ltd.,
Olympia Works,
Roundhay Rd,
Leeds 8.

(R 249)

'ENGLISH ELECTRIC'

FUSEGEAR DIVISION

who manufacture a wide range of switchboards and distribution equipment incorporating H.R.C. fuses, have a limited number of vacancies for experienced

SALES AND CONTRACTS ENGINEERS

at their Liverpool Works. These appointments command a good salary, are permanent and pensionable with life assurance benefits after a short qualifying period. There are excellent opportunities for promotion and advancement for keen young electrical engineers interested in making a career with the Company.

Outside Technical Representatives for both Home and Overseas territories are appointed from the inside Engineering staff from time to time, after completion of an initial period in the Works.

Qualifications required are H.N.C. or equivalent, together with sound practical training and experience in (a) industry, (b) electrical contracting or (c) electricity supply. Applications will also be considered from more junior engineers who are at present in the final year of study for the H.N.C. in electrical Engineering but who do not have commercial experience. In such cases training will be given. Generous assistance with removal and housing expenses will be given to successful candidates. Please write giving full details of qualifications and experience to Dept. G.P.S., Marconi House, Strand, London W.C.2, quoting reference ET497E.

(R 269)

CRATER PRODUCTS LTD.—Manufacturers of Rotary Switches wish to appoint a number of REPRESENTATIVES. Good connections are essential and will qualify for generous remuneration and expenses.—Apply Crater Products Ltd., Knaphill, Woking. Brookwood 2571. (R 214)

CABLE ESTIMATORS required by Hackbridge Cable Co. Ltd., Hackbridge, Surrey. Must be fully conversant with estimating for Paper, Rubber and Thermoplastic Cables. Pensionable post. Write stating age, experience and salary required. For the attention of the Sales Manager. (R 305)

J. LYONS & CO. LTD.

Ice Cream Division

require

ELECTRICAL DRAUGHTSMEN

who must have qualifications up to H.N.C. standard and some practical experience of installation work, H.V. and L.V. distribution, modern control gear, electronics and process control methods.

Please write stating age, qualifications and experience to The Personnel Manager, Works Department, J. Lyons and Co. Ltd., 143 Hammersmith Rd, London W.14.

(R 292)

ELECTRICAL ENGINEER ASSISTANT

The Overseas Engineering Department of the Dunlop Rubber Company Limited requires an electrical engineer assistant to work in their Birmingham Office on A.C. and D.C. motor control schemes and on H.T. and L.T. distribution layouts. The work also includes corresponding with overseas factories on general electrical queries.

Applicants should possess a Higher National Certificate (Electrical) and have had suitable experience. Age range: 25-40.

An attractive salary will be paid to the person appointed. Pension scheme; excellent working conditions. Holiday arrangements respected.

Confidential applications, giving qualifications, experience and salary requirements, should be addressed to:—

Staff Officer (OE), Employment Department,
Fort Dunlop, Erdington, Birmingham 24

(R 290)

'ENGLISH ELECTRIC'

(Whetstone Nr. Leicester)

OFFERS OPPORTUNITIES TO

ENGINEERS & DESIGNERS

IN THE FOLLOWING FIELDS

MECHANICAL ENGINEERS

1 Research and Development work on the mechanical components of reactor equipment.

2 Design of conventional plant for nuclear power stations including preparation of specifications, analysis of tenders and associated work up to the site commissioning stage.

3 Examination of the problems associated with fuel element design and development, this should particularly interest people with a knowledge of stress analysis or creep deflection of structure at high temperature.

4 The performance and optimisation studies of nuclear power stations, thermodynamics of gas circuits and steam circuits.

5 Theoretical and experimental investigation associated with heat transfer and gas flow in nuclear reactors.

6 Design and specification of the mechanical equipment associated with the core, fuel handling and control of nuclear reactors.

ELECTRICAL ENGINEERS

1 To develop special apparatus for the use of analogue computers.

2 To develop reactor control systems and electrical components of the equipment.

3 Design and contract engineering in connection with reactor auxiliary plant and reactor automatic control systems. The work involves responsibility for schemes from design initiation to site completion.

4 The design of power systems for nuclear power stations including preparation of specifications, analysis of tenders and associated work up to site commissioning stage.

• • •

The positions are permanent and pensionable and assistance will be given towards initial accommodation.
Enquiries giving details of past experience, qualifications, age and current salary (which will be treated in strictest confidence) should be addressed to the

Technical Staff Officer

DEPT. G.P.S., MARCONI HOUSE, STRAND, W.C.2

quoting reference E.T.1816H.

(R 293)

ELECTRICAL ENGINEER required for Glasgow Office staff, age 23-28. Applicants (H.N.C. minimum) should have had experience in the manufacture of electrical machines. Progressive salary with non-contributory pension. Applications stating age, nationality, qualifications and experience to British Engine Boiler and Electrical Insurance Co. Ltd., 98 West George St, Glasgow C.2. (R 289)

ELECTRICIANS.—Fully qualified Electricians required for general maintenance and installation work on large integrated Iron and Steel Works. Excellent conditions—pension scheme in operation.—Apply to The Employment Officer, Appleby-Frodingham Steel Co., Scunthorpe, Lincs. (R 162)

ENERGETIC and competent WORKS MANAGER required for rapidly expanding Electrical Engineering Company in Altrincham. — Box No. 7919, Electrical Times. (R 316)

ELECTRICAL ENGINEERING ASSISTANT, Borough Surveyor's Dept., Fulham Borough Council. Salary within range £635/£1,115. Applicants must have had experience in design and installation of street lighting and good general experience of electrical installations. Five-day week. Canteen. Details and application form from Town Clerk, Town Hall, S.W.6. Closing date: 11 July. (R 265)

ELECTRICAL ENGINEER

If you have a good honours degree in Electrical Engineering, are aged between 26 and 30, and would like to join the Commonwealth's largest glass manufacturing organisation, you are invited to write about yourself to the Personnel Officer (Graduate Recruitment), Pilkington Brothers Limited, St. Helens, Lancashire.

You would take charge of the impulse section of one of the best equipped High Voltage Insulator laboratories in the country, utilising test voltages of up to 2,000 kV. An extensive programme of research and development relating to toughened glass power line insulators is in progress. You do not require to have had previous experience of this type of work, we will arrange appropriate training.

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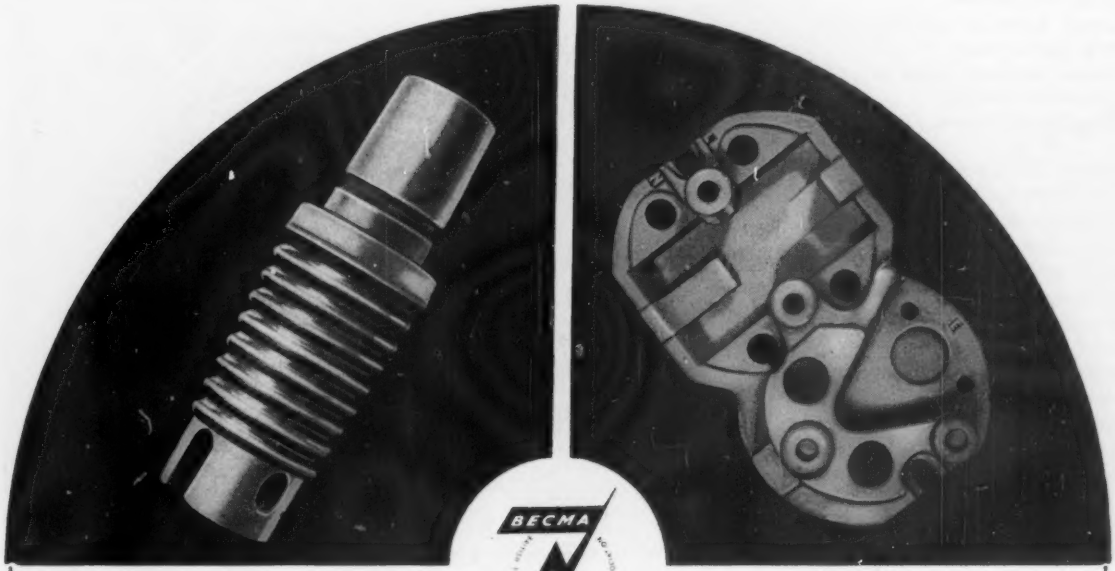

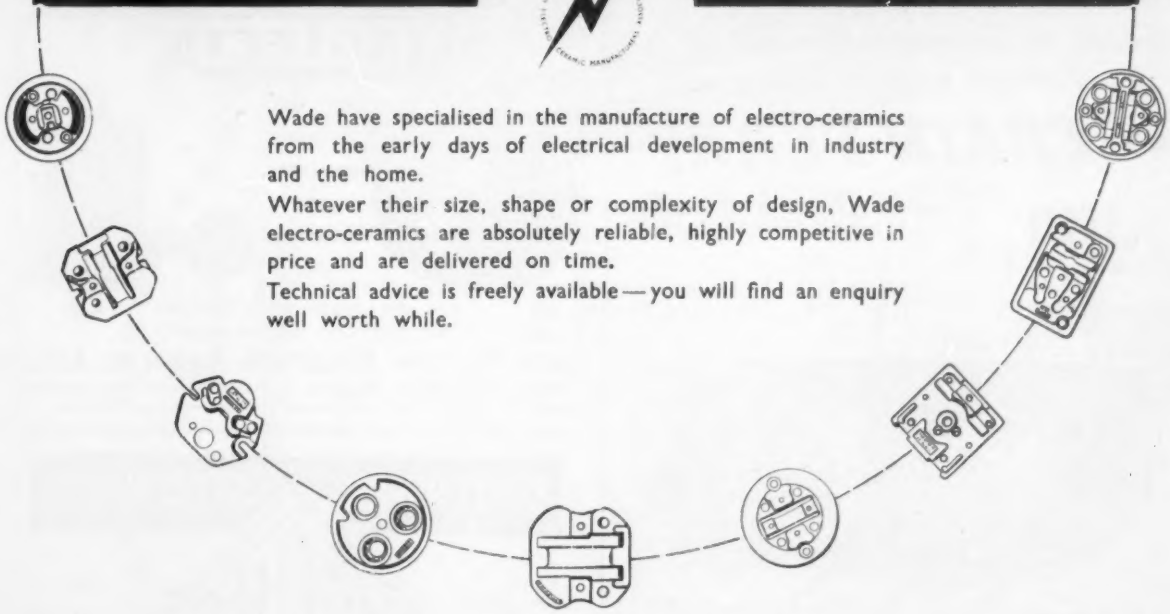

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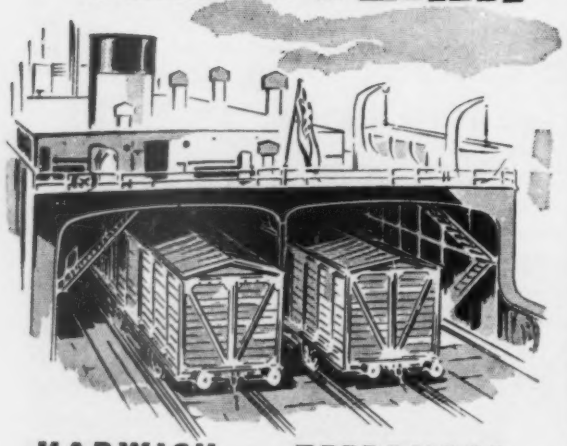

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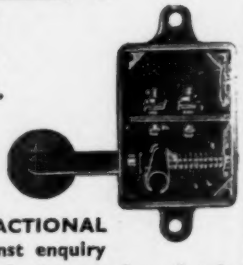

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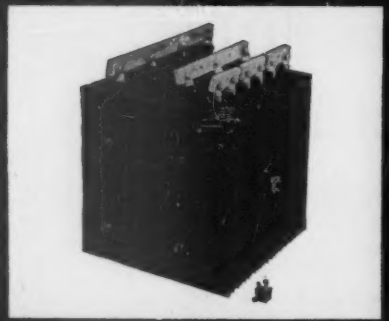

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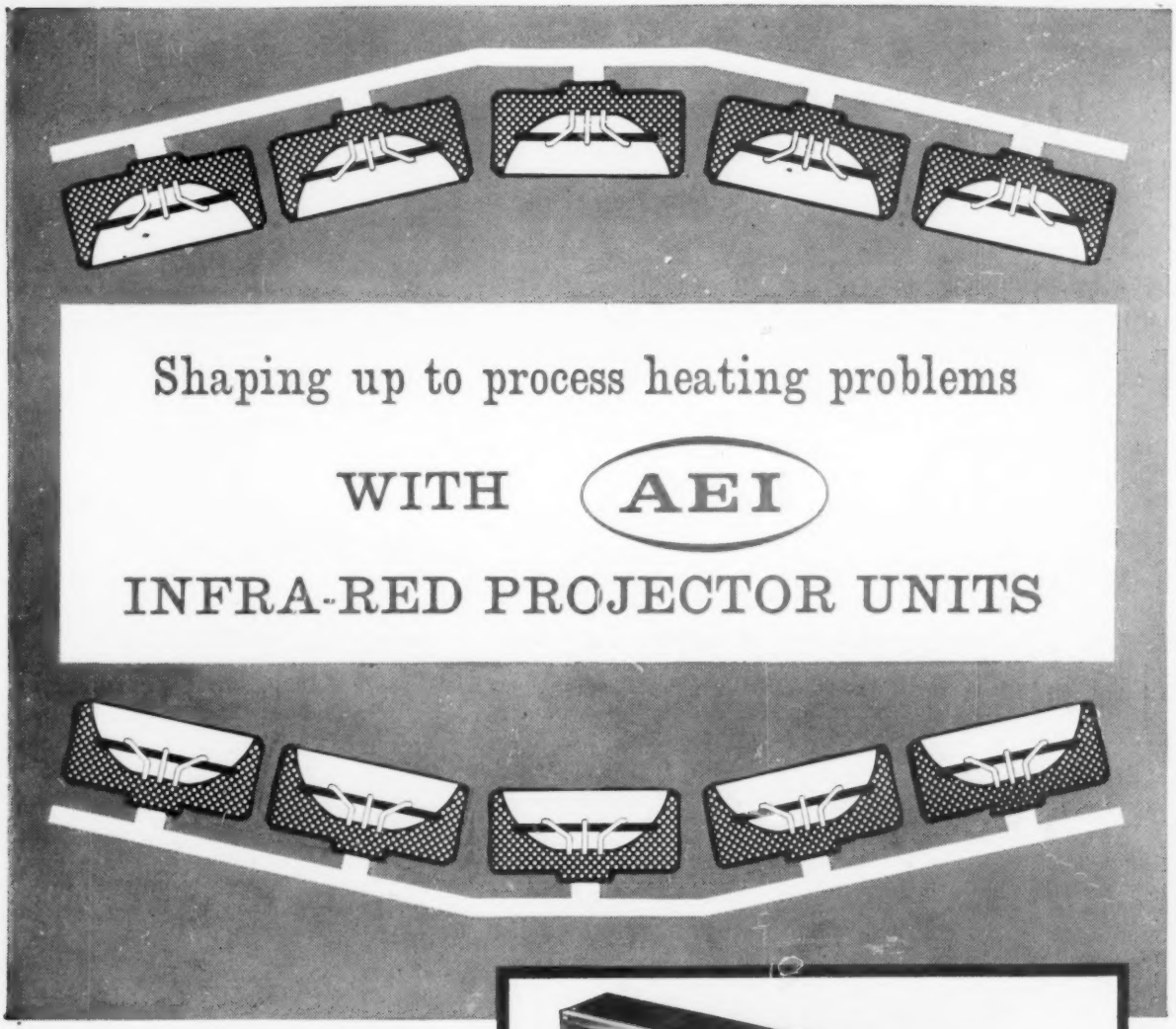

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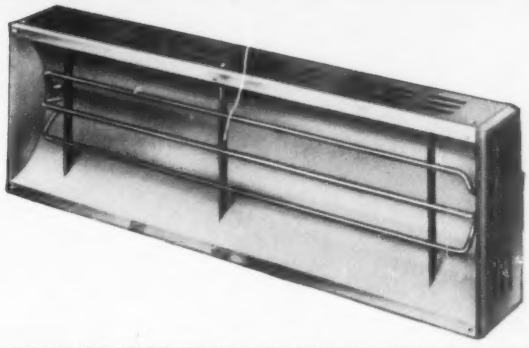

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